AVIATION WEEK

JUNE 21, 1954

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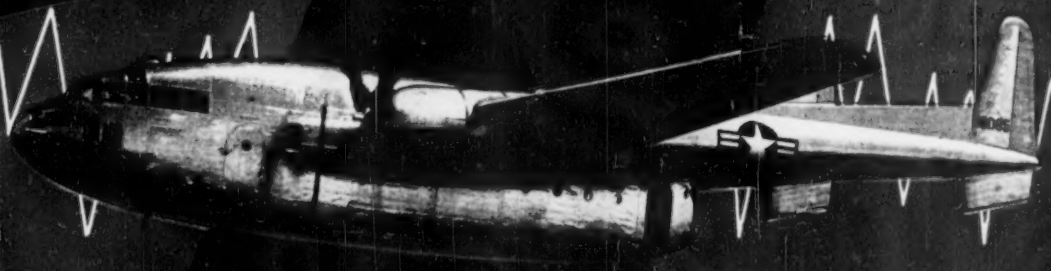

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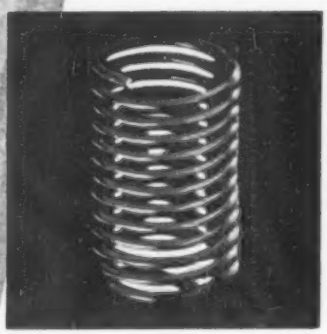

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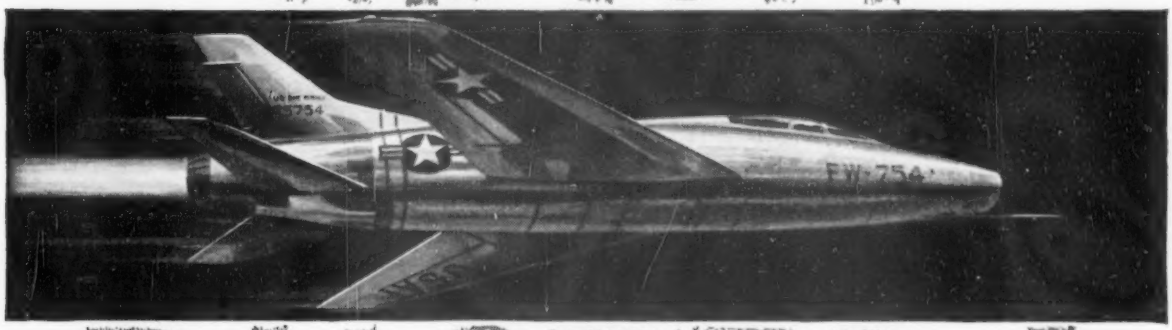

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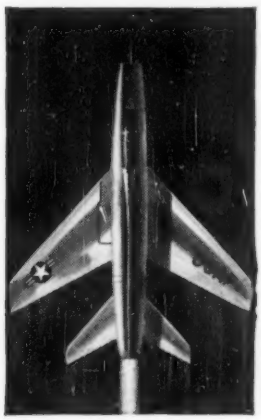

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MACH (pronounced "mock") is a term you'll be seeing more and more since it is the only really accurate way of evaluating jet plane speeds. The need for this special standard of measurement is due to the fact that the speed of sound varies with changes in temperature and altitude. At sea level, for instance, sound travels at speeds ranging from 0 perature of 60° to 790.7 MPH at 100°. However, using the Mach numbers, a jet traveling at Mach 1 is flying at the speed of sound, no matter at what altitude or temperature. Far advanced beyond any fighter now in production, the F-100 Super Sabre was designed and built by North American to meet our nation's need.

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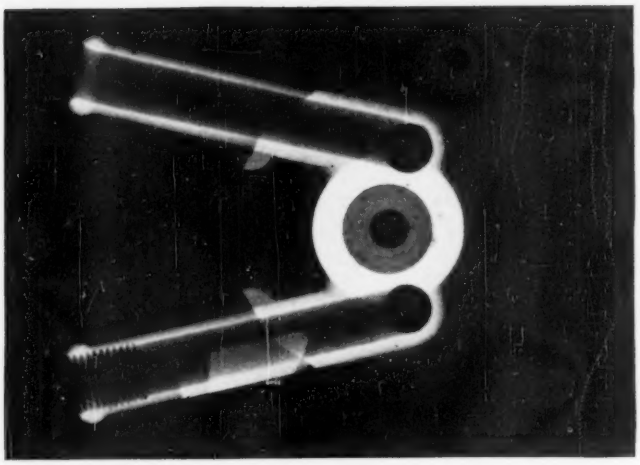

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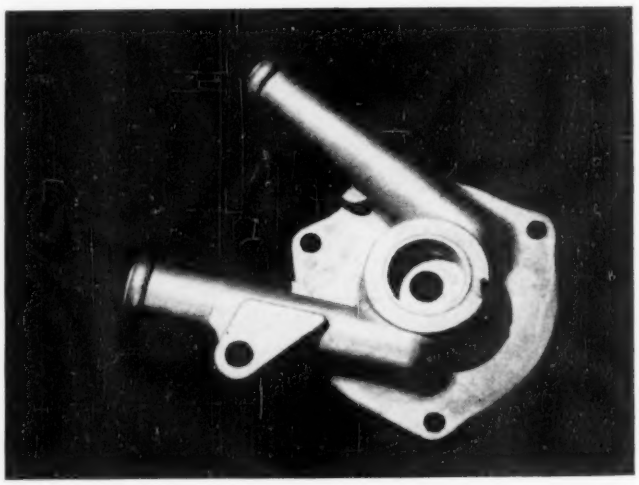

Radiography . . .
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NEWS DIGEST

Domestic

Great Lakes Airlines DC-4 crash-landed in flames last week at Gage, Okla., after an engine caught fire while the transport was flying through a thunderstorm on a nonscheduled New York-Seattle flight. All 78 persons aboard the burning plane escaped without injury.

H. Lee White has resigned as Assistant Secretary of the Air Force, effective July 2.

Harry K. Coffee, 59, board chairman and former president of the National Aeronautic Assn., was killed last week in a lightplane accident near Mt. Hood, Ore.

Pan American World Airways still intends to accept the three British Comet 3s it has on order if de Havilland Aircraft Co. works out the jet transport's troubles and gets U.S. certification of airworthiness, according to Wilbur L. Morrison, PAA executive vice president.

Helicopters never will equal the airplane in ton-mile efficiency, Igor Sikorsky told the Aviation Writers Assn. in Miami Beach. He listed these speed limitations for copters: pure helicopter, 150-200 mph.; compound copter, 200-300 mph.; convertiplane 300-500 mph. Practical use of the convertiplane is limited, Sikorsky said, because it is nothing more than an inefficient airplane combined with an inefficient copter—"an airplane with a helicopter on its back."

Aircraft employment may drop from its present 750,000 to 500,000, an Aircraft Industries Assn. spokesman predicts. The industry currently is producing 900-1,000 planes a month, of which 80% are military, he says.

Octave Chanute Award will be presented to George E. Cooper and the Thurman H. Bane Award to Dr. Helmut G. Heinrich at the Institute for the Aeronautical Sciences' annual summer meeting dinner June 23 in Los Angeles. Cooper, assistant chief of flight operations at NACA's Ames Aeronautical Laboratory, won the 1954 Trophy for "outstanding piloting and research at transonic and supersonic speeds." Heinrich, research engineer at Wright Air Development Center's equipment lab, will receive his award for developing the personnel guide surface parachute.

Cessna Aircraft Co. has ordered 100 Javelin single-axis autopilots, designed to prevent inadvertent spirals (Aviation Week Mar. 24, 1953, p. 34), for factory installation in its Model 170s and 180s. Javelin Aircraft Co., says its full output, presently 10 a month, has been contracted for by Cessna.

Bendix RDR-1 storm-warning radar will be evaluated by Pan American World Airways this summer on a DC-6B (Aviation Week Mar. 15, p. 128) in scheduled service to South America, Europe, Africa, the Middle East and the Orient.

Air Force Assn. has set up an annual Earl T. Ricks Trophy race for Air National Guard pilots, honoring the former chief of the National Guard Bureau's Air Force Division. First contest will be from California to Detroit's International Aviation Exposition July 24.

Aviation Writers Assn. elected LeRoy Whitman, editor of the Army, Navy, Air Force Journal, president at its annual convention in Miami Beach, Fla. He succeeds Ralph Platt of the Cleveland News. Other new officers: David R. Wallin, St. Louis Post-Dispatch, first vice president; Ross Willmot, editor of Canadian Aviation, second vice president; Vern Haugland, Associated Press, third vice president; Ralph H. McClarren, consulting engineer, secretary, and George F. McLaughlin, Aero Digest, historian.

Piper Tri-Pacer seaplane, equipped with Edo Model 2000 floats, has been approved by Civil Aeronautics Administration.

Bell Shows Details of 40-Passenger Copter

Artist's sketch (top photo) shows Bell Aircraft Corp.'s novel new 40-passenger copter configuration with rotors at each wingtip revealed for the first time in Aviation Week (May 31, p. 16). Cockpit is in the thick wing's center, with engines located at each end (either Wright R1820s or P&WA R2800s) and passenger seating arrangement with cabin windows in the leading edge. Either power unit will drive both rotors. Landing gear is retractable. The wide center of gravity for loading, similar to that of tandem designs, is an important consideration.

Financial

Northrop Aircraft, Inc., Hawthorne, Calif., reports consolidated net earnings of $1,854,856 for the first nine months of fiscal 1954, compared with $1,399,862 for the three-quarter period of 1953. Sales and other income dropped from $138,298,983 to $109,646,969. Backlog Apr. 30: $559 million.

McDonnell Aircraft Corp., St. Louis, has paid additional federal income tax of $198,369 plus $996,888 in excess profits tax for the three fiscal years ended June 30, 1951, 1952 and 1953. The company says these payments resulted from reduction of its excess profits tax credit by a U. S. Treasury audit.

North American Aviation, Inc., Los Angeles, has declared a 50-cent quarterly dividend on capital stock, payable July 6 to holders of record June 22.

International

Brazil's REAL airline has purchased controlling interest in Aerovias Brazil, debt-ridden carrier with liabilities estimated at $1.5 million. The price that was paid by REAL was $10.8 million for 87%.

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June 21, 1954

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Washington Roundup

USAF Procurement Financing

Top USAF budget officials have revealed that USAF has recovered $1,445 million in procurement funds during fiscal 1954 in the following categories:

- **Contract cancelations**—$931 million.
- **Spare parts revisions**—$351 million.
- **Price redetermination**—$163 million.

According to budgetary testimony before the Senate Appropriations Committee, USAF now expects to have a $4-billion carryover in unobligated procurement funds from fiscal 1954 and prior years into fiscal 1955. Of this total, some $1.9 billion has not yet been allocated for any specific program, but $2.1 billion is earmarked for specific procurement programs that have not yet matured into firm contractual obligations with industry.

USAF PIO Shift

Brig. Gen. Brooke E. Allen, Chief of Staff of the Military Air Transport Service, is scheduled to replace Maj. Gen. Sory Smith as chief of USAF public information.

Gen. Smith has served the longest Pentagon term of any senior military public information officer and has earned the respect of the working press for his energy and integrity. He entered the USAF Public Information Directorate as Deputy Director in 1949 after serving as executive officer to the late Gen. Hoyt S. Vandenberg, USAF Chief of Staff. Gen. Smith has been Director since 1950, serving through one of the stormiest periods in USAF history.

Gen. Allen has been a pilot for 20 years, earlier served in public relations as head of the Air Pictorial Service.

Red Air Research

USAF, in a belated defense of its much criticized research contract with Harvard University for social studies on Russia, reveals the project was not as much of a boondoggle as some uninformed executive and legislative officials claimed during fiscal 1954 budget hearings. The Harvard study included, among other things, research into the following problems faced by USAF in a war against Russia:

- How can you occupy territories captured by air?
- Can you control occupied territory by air alone?
- How do you communicate with enemy leaders, urban populations and the people at large?
- What would be the reaction of the Russian people to various types of USAF weapons?

USAF pointed out that even tentative answers to these questions cannot be given by military planners without access to the knowledge on the USSR being produced by the Harvard research contract.

Navy Korean Losses

Some idea of the high aircraft attrition losses suffered by United Nations forces in Korea can be gathered from recently released Navy statistics. Navy's pre-Korea stock of reserve aircraft dwindled by 3,900 aircraft during the Korean war from 4,500 aircraft to about 600 at the armistice.

Vice Adm. Ralph Ofstie, Deputy Chief of Naval Operations for Air, told the Senate Appropriations Committee that this 4,500-plane reserve was all the Navy had to plug the gap between the combat demands of the Korean war and the low rate of production for new Navy aircraft during 1950-53.

Asiatic Showdown Looms

As prospects for direct U. S. intervention in the Indo-China war fade, the probability of a major military showdown with the Communists in Asia increases. U. S. Joint Chiefs of Staff still are pushing hard for military intervention in Asia primarily with airpower, but top-level political decisions are keeping the military on the leash.

Meanwhile, initial air battles between Communist jet MiG-15s and Chinese Nationalist piston-powered F-51s may be the preliminary to large-scale Red air attacks on Formosa with the fleet of Il-28 twin-jet bombers now based along the China coast. The combat of Communist MiGs and Nationalist F-51s again highlights the technical inferiority of the aircraft the U. S. has supplied its allies, both in Europe and Asia.

Official Use Only

Latest security classification maneuver at the Pentagon: "For Official Use Only" has replaced the "Restricted" category which was abolished recently by White House executive order. New Defense Department directive finds there are some things not covered by the Eisenhower rule that still need "protection in the public interest."

Now these items can be released only by a "responsible official" who first must determine that the query is based on "legitimate interest." Directive says there will be no "arbitrary and unreasonable" withholding of information.

Landing Gear Tests

Bureau of Aeronautics is leading a new effort to draw up a joint Navy-Air Force specification on test methods to determine whether aircraft landing gears meet design strength requirements. Under present regulations, Navy requires manufacturers to conduct tests by dropping an entire airplane. USAF accepts static tests, conducted in special laboratory jigs.

BuAer's plans to revise Specification (SS-1C-2) are being delayed pending a possible agreement with USAF and contractors on a single standard.

Military Budget Rise?

Don't be surprised if the fiscal 1956 military budget reverses the current Republican economy trend and takes a sharp rise, particularly in aircraft procurement funds. Even if there is no shooting war in Asia, an increased aircraft procurement budget will be required next year simply to maintain and modernize the airpower force levels authorized by the Republicans for USAF, Navy, Marines and Army.

Fiscal 1955 budget requests for aircraft procurement were below this minimum maintenance requirement. Reason: The latest stretchout in military aircraft production enabled the Republican Administration to finance procurement from funds previously appropriated by the Democrats and thus hold requests for new procurement funds to a sub-minimum level.

—Washington staff

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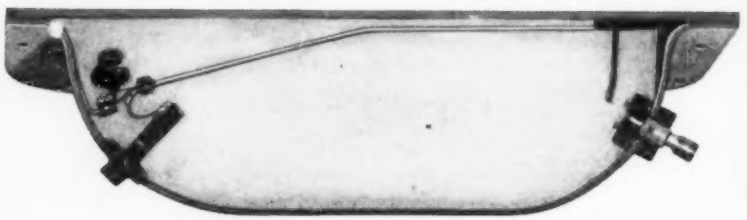
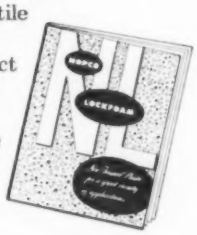


Illustrated is a half cross-section of the Type 140 Marker Beacon Aircraft Antenna made with poured Nopco Lockfoam by Electronics Research, Inc., Evansville, Ind. Before using Lockfoam, this manufacturer was unable to find an ideal reinforcing material which permitted air-tight sealing without deformation of the antenna cavity. In its present construction, the difficulties both of deformation and of possible seal rupture are eliminated.

eliminates aircraft antenna deformation caused by air pressures

And from the standpoint of production, states Electronics Research, Nopco Lockfoam has consistent pour characteristics, and bonds strongly to the antenna cavity walls and cover.

Perhaps the rare combination of properties of this versatile foamed-in-place plastic can help with some product *you* have in mind. At any rate, you'll want the full story. Write today for the Nopco Lockfoam booklet.



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6 lb/cu ft Lockfoam tested at 9.375 KMC
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Loss Tangent .0005

Good Thermal Insulation "K" Factors
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to .025 at 11 lb/cu ft

Wide Range of Densities
From 2 to 35 lb/cu ft

Great Versatility
50 different formulations available

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WHO'S WHERE

In the Front Office

Cheston M. Newhall is new president of the Babb Co. (Canada), Ltd., St. Johns, Que.

Joseph H. Lucas has been elected president of Aircraft Industries of Canada, Ltd., St. Johns, Que.

M. M. Frost has been moved up by Eastern Air Lines from vice president-traffic and sales to executive assistant to the board chairman. **William L. Morrisette, Jr.,** is new vice president-traffic and sales.

John J. Lee, onetime production executive for Curtiss-Wright Corp., has become executive vice president of Twin Coach Co., Kent, Ohio.

Arthur F. White has been elected secretary-treasurer of Pioneer Air Lines, succeeding **Eugene W. Bailey,** who resigned to join Dallas Aero Service.

J. C. Charleson, former Canadian manager for Piasecki Helicopter Corp., has joined Okanagan Helicopters, Ltd., Vancouver, B. C., as assistant to the president.

Changes

Kenneth F. Leaman is new assistant to the vice president-general manager of Republic Aviation Corp., Farmingdale, N. Y.

Douglas M. Heller has been promoted by Bendix Aviation Corp.'s Products Division to engineering director of the Mishawaka, Ind., missile plant. **Norman Caplan** has been appointed commercial engineering manager for the Radio Communications Division. Other missile section changes: **Richard E. Whiffen,** quality control manager; **T. S. Torian,** manager of planning, costing and scheduling; **Richard F. Hamaker,** chief administrative engineer.

Romus Soucek has become sales manager of the newly established sales and service department of Westinghouse Electric Corp.'s Aviation Gas Turbine Division, Philadelphia. **Raymond B. Rogers** is assistant sales manager.

B. W. Clawson has been named manager of Douglas Aircraft Co.'s Tucson, Ariz., plant. Clawson has been quality control manager at Douglas-Long Beach Division.

Philip H. Emrich has been appointed by Vickers, Inc., as manager of the Joplin, Mo., plant. Also promoted: **Gordon Elliott,** Omaha plant manager; **Gregory M. McKeown,** manager of the product service department, Detroit.

Honors and Elections

Calvin M. Bolster, coordinator of development for General Tire & Rubber Co. and former chief of Naval research, has won his second Legion of Merit medal from the Navy for "outstanding service in the field of guided missile development and anti-submarine warfare."

Orvis M. Nelson, president of Transocean Air Lines, and his Taloa associates have been cited by the Oakland, Calif., chamber of commerce and World Trade Club for "major contributions to the advancement of world trade by air."

INDUSTRY OBSERVER

► Convair is completing another version of its Sea Dart (F2Y) delta-wing water-based fighter featuring a single hydro-ski. Earlier F2Y prototypes had a double hydro-ski. Both types of ski gear will be evaluated to determine the best configuration for a production model. Convair also will switch its twin-engine design to a single powerplant on production Sea Darts—either the Wright J67 or the Pratt & Whitney J75.

► Navy has funds in its fiscal 1955 budget to convert a limited number of combat-type aircraft to airborne missile launchers, Rear Adm. Apollo Soucek, Chief of the Bureau of Aeronautics, recently told a senate committee.

► Navy plans to spend $28,842,000 on commercial contracts for aircraft overhaul and maintenance during fiscal 1955.

► Specifications of the Chance Vought Regulus surface-to-surface bombardment missile were displayed publicly by the Navy at the Aviation Writers Assn. convention in Miami Beach. According to a Navy placard, the Regulus has a span of 21 ft., length of 32 ft., and a takeoff gross weight of 14,522 lb. James H. Smith, Assistant Secretary of the Navy for Air, told the AWA convention that the atomic-powered submarine, Nautilus, is designed to carry the Regulus as part of its armament.

► Martin Matador surface-to-surface bombardment missile has been given a thorough test under varying climatic conditions down to minus 60F. Several successful Matador launchings have been made in driving rain at the USAF Missile Test Center, Cocoa, Fla.

► USAF has ordered 89 Ryan X-2 Firebee drone targets to be powered by the Continental Motors J69 turbojet. The J69 is being developed to produce 1,000 lb. thrust to match the thrust of the Fairchild J44 turbojet also used on the Firebee.

► Eight American aircraft firms are engaged in a military competition for development of a supersonic turbojet-powered target drone.

► Navy plans to spend $2,565,000 to modify nine of its Douglas R6D (DC-6) transports to give them longer range and improved flight safety characteristics.

► The Republic F-105 fighter bomber is similar to the F-84F in general appearance. However, it features more sweep on the wing, and is larger than the F-84F. It has wing-root air intakes for the Allison J71 turbojet and an interchangeable solid nose that can house photo equipment or armament for tactical operations.

► North American Aviation has a lightweight fighter proposal called the Guppy. It is in the same general category as the Northrop Fang. Lockheed F-104 with a gross of 18,000 lb. is too heavy to be classed in the lightweight fighter category.

► Allison has developed a special version of its J33 centrifugal flow turbojet for missile use in the Martin Matador and the Vought Regulus. It uses short life components manufactured from less critical materials and a simplified accessory system.

► Noise control committee of Aircraft Industries Assn. has analyzed major ground muffler installations for jet engines, now urges more basic research on materials and design in effort to improve them.

► Proposed congressional slash of $17 million from Navy aircraft operating funds would mean a reduction of 367,933 flying hours out of a 4.8-million total and elimination of 589 scheduled aircraft engine overhauls.

► Tactical aircraft of the Air National Guard will be 68% jet-powered by the end of fiscal 1955, 92% by the end of fiscal 1957.

► USAF tentatively has assigned the designation F-107 to the North American F-100B, an all-weather version of the Super Sabre. The F-100C will be the fighter-bomber version carrying a heavy load of external armament and fuel.

AVIATION WEEK VOL. 60, NO. 25 JUNE 21, 1954

U.S., Britain May Merge Missile Efforts

- **Wilson says coordination would speed program.**
- **Senate group criticizes unnecessary duplication.**

By Katherine Johnsen

New steps to streamline the U. S. guided missile program and coordinate it with the British program are in the offing.

Two main developments are:

• After extensive hearings, mostly off-the-record, Senate Appropriations Committee found "a disorganized situation relating to the guided missile program" and "directed" the Secretary of Defense to investigate and report findings to the committee by mid-January (AVIATION WEEK Mar. 2, 1953, p. 83; Mar. 15, p. 78). The committee declared:

"Service witnesses in almost every instance while lauding the characteristics of the missiles under production for their particular service had a tendency to belittle the programs of the sister services.

"Without attempting to pass military judgment, it appears . . . that it would be practical to make some attempt to standardize at least those missiles which are being produced for approximately the same mission."

• Defense Secretary Charles Wilson announced, after four days of conferences in Washington with British Minister of Supply Duncan Sandys, that "arrangements were considered with the object of securing more active cooperation in this field" of guided missiles development.

He added: "This should enable both countries to make the most productive use of their available scientific and technical resources and should help to speed up the development and introduction of guided missiles for the use in the common defense."

Sixteen top-level U. S. and British officers and officials participated in the conferences.

Previously, Britain's Sandys made "an extensive tour of experimental establishments in different parts of the U. S. concerned with the development of guided missiles."

► **Missile Evaluation**—The Senate committee's criticism of the guided missile program comes after repeated attempts by Defense Department over the last few years to cut out unnecessary duplication and wasteful competition among the services.

The most recent evaluation—made by a team headed by Trevor Gardner, special assistant to the Secretary of the Air Force for research and development—was completed and turned over to the Secretary of Defense early this year after six months' investigation.

The team included: Rear Adm. John Sides, director of guided missiles for Navy; Maj. Gen. Donald Yates, then USAF director of research and development, and Brig. Gen. K. F. Hertford, Army's deputy assistant chief of staff for research and development (AVIATION WEEK Aug. 31, 1953, p. 18).

The fiscal 1955 defense budget provides $625 million in new money for research and development and procurement and production of missiles (AVIATION WEEK Apr. 26, p. 12).

New obligations during the year, however, probably will be about double this amount because of big carryovers. For example, the USAF program for missile production and procurement calls for $265 million for fiscal 1955, but USAF anticipates making new obligations of $466 million.

► **Increasing Emphasis**—Two trends in the missile program were indicated in Senate Appropriations Committee hearings:

• **Caution in advancing to production.** Gen. Hertford said the Army is putting increasing emphasis on applications engineering in its program in line with the policy expressed by Brig. Gen. T. P. Gerrity that USAF is "emphasizing development and testing . . . and limiting production to those missiles . . . which have completed their development phase" (AVIATION WEEK May 31, p. 14).

Hertford observed: Considerable time, effort and money is saved "by studying during the final portions of the research and development phase what can be done to the various components to redesign them so that they still perform the same function and yet allow easier, faster, cheaper production. . . . This same process continues during production so that ever-increasing savings are normally realized."

• **Change to "fixed-price" contracts.** Navy testimony highlighted efforts in the direction of putting missile contracts on a "fixed-price" instead of "cost-plus-fixed-fee" basis to provide incentive to industry and savings to the government (AVIATION WEEK Apr. 26, p. 14).

In testimony left on the record by the Senate Appropriations Committee, Army compared its atomic delivery systems favorably to air support. Navy de-

$4.7-Billion Airpower Budget

Senate Appropriations Committee has approved $4.7 billion for aircraft and related procurement by the Air Force and Navy for fiscal 1955, the amount already approved by the House.

The $2,760 million voted by the committee for USAF was the amount recommended by the Administration. It is $735 million less than the $3,495 million for fiscal 1954.

The $1,973 million approved for Navy was $13 million less than the Administration's request but $595 million more than Navy's plane procurement appropriation for fiscal 1954. The House made the $13-million cut, endorsed by the Senate committee, because testimony on the need for the money for missile facilities was "replete with indications of uncertainty."

In other actions taken to clear the bill for Senate floor action, the Appropriations Committee:

• Restored a $21.5-million cut made by the House in USAF's appropriation for research and development, approving the Administration's request of $431 million. This is $9 million less than the fiscal 1954 appropriation.

• Continued the availability of a $250-million appropriation made last year for reserve tools and facilities for an industrial mobilization base. Defense witnesses, lukewarm last year, strongly supported the project this year and said they were prepared now to move forward with it.

• Endorsed the House action in consolidating all Navy research and development appropriations. Under the plan, Navy will be given one appropriation to divide among its technical bureaus.

fended the merits of its missile programs but USAF made no statement direct to the military merits of its programs.

Presumably the committee's findings of inter-service wrangling was based primarily on testimony deleted from the record.

▶ **Army, Navy vs. AF**—These are the significant statements made to the committee:

• Brig. Gen. Hertford defended the Army's 280-mm. guns as "by far the most accurate delivery means" of atomic firepower presently available for ground troop support.

"The atomic shell is fired from a gun whose accuracy is considerably greater than that of bombs dropped by tactical support aircraft," he said. "Even with atomic weapons which have a comparatively large lethal area, accuracy is essential for close support missions in order to assure maximum target destruction with complete lack of effect on our own troops. . . .

"When bombers, free rockets or guided missiles approach the accuracy and reliability of the gun, we shall re-evaluate the various weapons systems and select those developments permitting greatest effectiveness with minimum expenditures of money and manpower," he said.

• Maj. Gen. John Uncles, chief of Army research, cited the advantage of the Army's complementary surface-to-surface delivery system of atomic guns, guided missiles and free rockets, over air support. He declared: "Adverse weather conditions which prevent air strikes will not lessen the effectiveness of the Army delivery systems."

• Rear Adm. Apollo Soucek, chief of the Bureau of Aeronautics, told the committee, "I would like to leave with you this principal thought: We have been planning, designing and evaluating missiles for a number of years and have been successful in advancing these weapons to combat status."

BuAer's program, he added, "has been integrated with missile programs of the other services by the Secretary of Defense and is in balance with the over-all Department of Defense program.

▶ **Missile Conferences**—U. S. participants in the Wilson-Sandys conferences on guided missiles: Donald Quarles and H. Struve Hensel, Assistant Secretaries of Defense; John Slezak, Undersecretary of the Army; Brig. Gen. Harry Roper, Army's Deputy Assistant Chief of Staff; Vice Adm. Ralph Oftsie, Deputy Chief of Naval Operations; Rear Adm. John Sides, Navy director of guided missiles; James Douglas, Air Force Undersecretary; Trevor Gardner, and USAF Maj. Gen. H. B. Thatcher.

British participants: Sir Roger Nakins, British Ambassador to the U. S.; Sir Steuart Mitchell, Controller of Guided Weapons; Dr. O. H. Wansbrough-Jones, chief scientist for the Ministry of Supply; Sir Richard Powell, Deputy Secretary for the Ministry of Defense; S. Scott-Hall, Chief of British Technical Mission in Washington; and Adm. Hughes-Hallett, Gen. Prior-Palmer and Air Commodore Grundy of the British Joint Staff Mission in Washington.

Quick CAA Viscount Approval Forecast

Prompt U. S. certification of the Vickers-Armstrongs Viscount turboprop transport appears certain.

Civil Aeronautics Administrator Fred B. Lee said that the Viscount has no radical engineering or design problems and that no difficulties are foreseen. Capital Airlines recently purchased three Viscounts and has options for another 37 of the British planes (Aviation Week June 14, p. 16).

Lee made the statement at a press conference participated in by members of the CAA certification team that toured England, Holland, France and Italy.

▶ **4-6 Weeks Study**—CAA will study the data brought back from England by its certification team to determine if any additional requirements are necessary beyond those used by the Air Registration Board in England. "This will require a four- to six-week study period," Lee said, "and at the end of the period we will let the British know our conclusions." The Air Registration Board will be relied upon regarding compliance, Lee said.

Lee said the Rolls-Royce engines in the Viscount can use either kerosene or JP-4 fuel, but that the British prefer kerosene.

The certification team examined also the Bristol 173 helicopter in England (Aviation Week June 14, p. 9) and the Fokker F-27 turboprop transport in Holland. During a visit to France, the team investigated the Sncaso helicopter, Djinn 1220, the Allouette helicopter, the Sncase Caravelle 210 and the Hurel Dubois H.D.-32 transport which is aimed at being a replacement for the DC-3. The team then visited Italy, where members examined the Nardi FN-333 and a Piaggio five-place amphibian.

Lee said top priority in certification process will be given to planes ready for import to the United States.

Senate Boosts CAA Budget $1.5 Million

The Senate has increased Civil Aeronautics Administration's fiscal 1955 budget in the Commerce Appropriation Bill $1.5 million over the House-approved figure.

In two changes, to be resolved by a conference committee, the Senate:

• Approved $1.4 million for operation of 52 low-frequency radio ranges serving civil and military aircraft equipped only with low-frequency radio receivers and 37 radio stations for air-ground communications. This was an addition to the Administration's, as well as the House's, proposal.

• Restored a $100,000 House cut for operation of Alaskan airports and allowed the $650,000 recommended by the Administration.

The Senate also approved for Civil Aeronautics Board's fiscal 1955 administrative expenses, the amount recommended by the Administration and previously voted by the House. It is $27,000 more than the Board's fiscal 1954 budget.

▶ **Airport Funds**—The total $105,250,000 approved by the Senate for CAA's 1955 budget is $33,535,000 below the current budget. The 1955 figure, however, carries no funds for airport construction, while the 1954 budget includes $22.7 million for liquidating airport construction commitments.

The $22 million proposed by the Administration for fiscal 1955 airport aid is included in a supplemental appropriation bill now before the House Appropriations Committee (Aviation Week June 14, p. 7). The Administration recommended $20 million for U.S. projects, $250,000 for Puerto Rico, $50,000 for the Virgin Islands, $225,000 for Hawaii, $225,000 for Alaska, and $1,250,000 for planning and administration.

▶ **Murray Fund Reduced**—A 17% cut in the fiscal 1955 budget for commerce Undersecretary for Transportation Robert Murray, made by Senate Appropriations Committee, was approved by the Senate.

The committee's action reduced the allocation for the Office of the Undersecretary for Transportation and the Office of Transportation from the $148,000 recommended by the Administration to a total "not to exceed" $123,000.

The $25,000 reduction followed a heated session several weeks ago between Murray and Sen. Pat McCarran, high-ranking Democrat on the committee (Aviation Week Apr. 19, p. 13).

The committee increased by $100,000 the overall $2 million allowed by the House for the Secretary of Commerce but stipulated the limitation on the apportionment for the activities of the Transportation Undersecretary.

The $123,000 ceiling would mean a reduction in Murray's staff.

For Mach 2 Speeds

U.S. Turbine Program Needs Push

By Robert Hotz

Organization of a joint industry-military research engine program to accelerate development of American supersonic powerplants is being discussed seriously in top-level scientific circles.

The research engine program would be aimed at doing the job for powerplant development that the research aircraft program—jointly sponsored by USAF, Navy, National Advisory Committee for Aeronautics and airframe manufacturers—accomplished in speeding accumulation of supersonic airframe design data during the past decade.

▶ **Top Problem**—Support for the research engine program is being stimulated by a feeling among top military and airframe manufacturing technicians that the United States is lagging behind both Britain and Russia in the development race toward producing powerplants capable of propelling an airframe at Mach 2 over sufficient range to perform military missions.

Many of these technicians feel strongly that developing powerplants for sustained flight at Mach 2 is the most serious problem confronting the architects of U. S. airpower today.

This problem is complicated further by the opinion that the traditional lag of engine development behind airframe progress is increasing rapidly in the supersonic realm because of the impetus given airframe development by the highspeed research aircraft program.

Veterans of the highspeed research aircraft program emphasize that the requirements of supersonic flight have increased radically the importance of the powerplant in relation to the airframe. The traditional dominance of the airframe in relation to powerplant in subsonic flight has reversed in supersonic flight, with the engine and its fuel system becoming the dominant design consideration.

Discussions of the research engine program are spiced liberally with criticism of the American aircraft engine industry's current approach to its development problems. Criticism of the engine development technique include:

- Failure to utilize adequately the results of recent scientific research in the gas turbine field.
- Application of subsonic concepts to the problem of supersonic powerplants.
- Concentration on developing universally applicable engines instead of the specific types tailor-made to specific airframes that are required for successful operations in the Mach 2 speed range.
- Concentration on an evolutionary development of gas turbine engines when a revolutionary jump in performance is acutely needed to maintain the pace of the international airpower competition.
- Failure to recognize the fundamental changes in the relations of airframe and engine manufacturers required by the problems of successful and sustained supersonic flight.

"American jet engine manufacturers are dragging their feet on applying the results of gas turbine research done during the past five years," one airframe designer with considerable experience in designing supersonic airframes told AVIATION WEEK.

"The Germans had aircooled turbine blades operating in World War II but there isn't an American jet flying today that utilized this type of blade and the resultant high turbine inlet gas temperatures it permits."

▶ **'Naive Enthusiasm'**—A more restrained viewpoint was expressed by a top gas turbine research expert, who told AVIATION WEEK:

"Engine manufacturers, both in this country and abroad, are following up on these research leads in their component development work. In his naive enthusiasm, however, the research worker is somewhat impatient with production considerations that somehow seem to prevent the rapid rate of progress he so anxiously expects."

"The engine industry is still thinking in subsonic terms while tackling a supersonic problem," said another airframe designer. "We found out in the airframe business that you have to junk your subsonic ideas when trying to work with supersonics. The engine industry will have to learn that lesson before they get very far."

▶ **Objectives**—The proposed program for government-financed research engines, to be built and tested by industry after the pattern of the highspeed aircraft program that produced the Bell X-1 series and the Douglas D-558 series, would be expected to accomplish the following objectives:

- Allow broader exploration of the powerplant spectrum for highspeed flight. Observers emphasize that U. S. development now offers blanks for such promising developments as ducted fans and bypass turbojets.
- Allow the engine industry to branch out into basic new design concepts without the urgency to make these concepts into a "bread and butter" production engine and without the alternative of suffering heavy financial penalties for unfruitful ideas.
- Speed the engine development cycle by applying laboratory-proved ideas to specific whole-engine concepts. Essentially this would provide a method of bridging the experimental development gap between the laboratory and the service-ready operational engine.
- Help the engine industry to cut down the current wide lead-time gap between airframe and powerplant development cycles by getting radically advanced engine developments financed and underway long before the airframe projects that eventually will use them begin their development cycle.

▶ **Engine Life**—Research engines would be aimed at a relatively short life since considerable development data could be obtained from a 10 to 25 hr. running life. Most aircraft engine research in this country now is concentrated on component development.

The research engines would provide an opportunity for the vital task of matching components to get whole-engine performance in the speed and altitude range required.

One of the major problems in supersonic powerplant development is the necessity for getting such an engine to operate over a speed and altitude spectrum ranging from low-speed takeoff and landing at sea-level to Mach 2 level flight at altitudes over 50,000 ft.

Proponents of the research engine program emphasize that it would give the engine manufacturers more freedom in their development work without the necessity to guarantee service performance of a production model.

They believe the necessity for engine manufacturers currently to turn all development work into successful bread and butter production engines discourages them from abandoning the evolutionary approach and embracing the revolutionary changes already apparent on the engine development horizon.

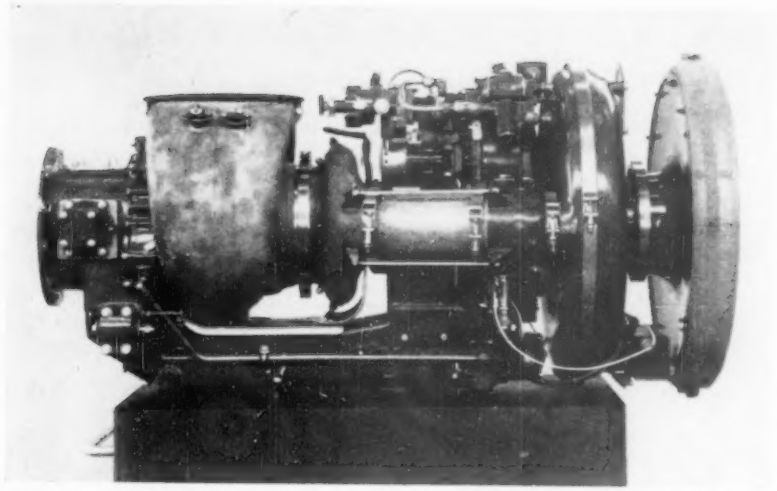
USAFE Wins A-Bomb Special Delivery Meet

Nellis AFB, Nev.—The 12 best combat teams, representing eight far-flung commands, competed here in USAF's first all-jet fighter gunnery and weapons meet.

U. S. Air Forces in Europe took top honors in the atomic bomb "special delivery" event, winning over teams representing the Strategic Air Command, Far East Air Forces and the Tactical Air Command.

All four teams flew Republic F-84G Thunderjets in the A-bomb competition, closed to the public and press throughout the seven-day meet.

▶ **Overall Winner**—ATRC was overall air-to-air and air-to-ground winner, scoring 3,153 points out of a possible 5,600.



BOEING 502-10, showing gas producer section at right, power output section at left.

Copter Group to See New Turbine

A new small gas turbine engine, capable of 270 hp. at takeoff, will be exhibited by Boeing Airplane Co. this week at the 10th annual forum of the American Helicopter Society in Washington, D. C.

The 320-lb. unit, designated Boeing Model 502-10 turbine, has a normal rated power of 240 hp. at 2,900 rpm. Fuel consumption is 25% less than that of its predecessor, Model 502-2, which had a normal rated horsepower of 175 and takeoff horsepower of 210.

► **Free Turbine**—Improved power and economy are achieved in the new unit, according to Boeing engineers, by better turbine and compressor designs. Pressure ratio of the compressor has been increased.

Like Model 502-2, the new engine is a "free" turbine with no direct mechanical connection between the gas producer and the power output section. Only a duct that confines the flow of gasses from the gas producer to the power source provides a link between the two sections.

The gas producer includes the compressor-turbine rotor, burners and the accessory drive section. The output section includes the free-wheeling power turbine, reduction gears and the output shaft.

► **Copter Application**—Initial display of the 502-10 at the helicopter society meeting indicates that Boeing hopes the new engine will find application in the rotary-wing field.

The earlier version has more than 100 hr. of time logged in the Kaman K-225. Early this year, in another Kaman experiment, a twin-engine installation of the 502-2 turbine was made on the HTK-1 helicopter (AVIATION WEEK June 7, p. 14).

Sikorsky is flying an S-52-5 equipped with the French Artouste 2 gas turbine (AVIATION WEEK Feb. 22, p. 22).

Use of turbines in helicopters offers advantages of light weight, high power and small volume. Model 502-10 requires only 15 cu. ft. with a silencer installed on the inlet. Disadvantage is high rate of fuel consumption, although Boeing engineers say their engine can operate on any type of fuel from diesel oil to gasoline.

The 502 family of turbines in total have had about 30,000 hr. of operation in helicopters, light planes and trucks. Most recent installation was by the Navy in an LCVP (landing craft vehicle for personnel) that is ready for fleet trials.

A Cessna L-19 powered by a 502 turbine holds the world altitude record for light planes—37,063 ft.

KLM Wins Operating Rights in Philippines

(McGraw-Hill World News)

Manila—KLM Royal Dutch Airlines has won permission to operate passenger flights to and from Manila, becoming the first foreign carrier to cash in on Philippine Air Lines' suspension of international services (AVIATION WEEK Apr. 5, p. 11).

The government has authorized KLM to exercise Third, Fourth and Fifth Freedom rights in Manila in operation of air service from Amsterdam to the Philippine capital via Frankfurt, Rome, Munich, Beirut, Karachi and Bangkok.

These flights are limited to two a week in either direction.

Meanwhile, Air France has asked permission to take on and unload passengers and cargo in the Philippines in an effort to extend its Constellation service from Saigon to Tokyo via Manila.

Subsidy Cuts

- **CAB gets $40 million for airline payments.**
- **But Congress prepares data for new showdown.**

Congress has postponed a major showdown on airline subsidies until next January.

The Senate voted Civil Aeronautics Board $40 million for subsidy payments, the amount already approved by the House. This, plus an $8-million carryover, will be sufficient to make payments at the estimated rate of $6.7 million monthly from July 1 to February.

Meanwhile, the Appropriations Committees of both houses will gather data for the January review. The Board asked for $73 million for fiscal 1955. With the carryover this would provide more than $80 million for payments to carriers.

► **Cut Defeated**—There was no move in the Senate to grant CAB its full request. The $40 million recommended by the Appropriations Committee was accepted after defeat of an amendment to reduce it to $30 million by limiting international subsidies.

Sponsored by Sen. John Kennedy and Paul Douglas, the amendment would have limited payments to international airlines to $15 million, or $2.1 million monthly over the seven-month period.

CAB estimates a requirement of $4.1 million monthly for international subsidies over the coming year.

Kennedy led a lone fight for the $10-million additional cut. He was opposed by Sens. Styles Bridges, Harley Kilgore, Warren Magnuson, Pat McCarran and Edwin Johnson.

► **Offset Effects**—Bridges pointed out that by next year Congress will be in a position to weigh the effects of two actions affecting airline subsidy: the Supreme Court decision requiring airlines to offset subsidies of one division with profits of another division and the Administration's policy of eliminating uneconomic duplicative services.

"Because of these two factors," he remarked, "the committee gave to the CAB what it would normally use under the current rate of making payments. Then we requested CAB to appear before the committee in January . . . with the thought that savings could be made."

► **Study Planned**—Kilgore, one of the most outspoken critics of airline sub-

sidies, concurred in the recommendation of the appropriations committee that the decision as to whether Congress should disallow funds for airline subsidy payments should be put off until January.

By that time, he said, he expects to have data on airline expense accounts; an evaluation of a report by the Postmaster General, charging $50-million "excess earnings" claimed by air carriers; information on airline taxes offset with subsidy; and information on subsidiaries, such as hotels, that might be financed with subsidy. He also is studying payments by subsidized airlines to legal firms, advertising agencies and other outside firms (see p. 88).

The Postmaster General's report presented by Kilgore, which has been challenged by CAB and Air Transport Assn., named six carriers as having "excess earnings": Delta-C&S Air Lines, $2,746,000 ($2,092,000 attributable to the offset principle); Western Air Lines, $350,000; Pan American World Airways, $6,815,000 ($1,800,000 attributable to offset principle); Trans World Airlines, $24,030,000 ($11,872,000 attributable to the offset principle); United Air Lines, $15,857,000; Braniff Airways, $1 million.

► **Overpayment?**—CAB estimates that the subsidy bill of only one airline, TWA, "might be" reduced in the amount of $1.5 million by the offset decision (AVIATION WEEK Mar. 8, p. 12).

Kennedy charged that, "according to the Post Office Department, certain airlines have been overpaid since 1946."

"If they have been overpaid," Magnuson countered, "the Attorney General should sue them. I would like to project myself into the time when I could see the results of those suits. I have had occasion to examine the figures of the Post Office this year. Sometimes they are a bit inaccurate." Magnuson is a member of the Post Office Appropriations Subcommittee.

► **Subsidy Debate**—Bridges and Kennedy clashed over whether CAB could favor one class of airlines in making subsidy payments. Kennedy argued that his amendment would not affect payments to domestic lines but only would cut back payments to international carriers.

Bridges pointed to the testimony of CAB Chairman Chan Gurney that, under the 1938 CAA Act, the Board would "pay each carrier every month as long as the money lasted."

Sen. Edwin Johnson challenged Kennedy's claim that Congress can refuse to appropriate funds for airline subsidies. Under Existing law, Johnson declared, "when CAB makes a recommendation to Congress, Congress is duty bound to follow the recommendation."

AA Wins 8-Hour Waiver Fight

CAB ruling increases crewtime on nonstop DC-7 and Lockheed 1049 flights; pilots protest decision.

American Airlines won its battle last week for a waiver from the 8-hr. domestic airline flight time regulation when Civil Aeronautics Board adjusted flight time to 10 hr.

CAB's three-two decision also gave Trans World Airlines and United Air Lines permission to begin nonstop westbound flights June 18.

Chairman Chan Gurney, vice chairman Harmar Denny and member Oswald Ryan voted for the waiver, with Josh Lee and Joseph Adams dissenting.

► **Nonstop Rule**—The special Civil Air Regulation devised by the Board reads:

"Notwithstanding the requirements of Part 40.320 (B) of the Civil Air Regulations, air carriers in the conduct of scheduled transcontinental nonstop flights may schedule flight crew members for more than eight but not more than 10 hr. of continuous duty aloft without an intervening rest period, provided that the flight is conducted in pressurized airplanes with a flight crew of at least two pilots and a flight engineer.

"This regulation shall apply only to scheduled transcontinental nonstop operations and shall terminate with the effective date of any final action taken by the Board" on the proposed change of the regulation CAB proposed May 28 (AVIATION WEEK June 7, p. 112).

► **ALPA Fight**—Air Line Pilots Assn., bitterly opposed to such a waiver, immediately indicated it would continue the fight along these lines:

- Circulate a strike ballot among pilots of three of the Big Four airlines.
- Seek reconsideration of the Board's waiver.
- Ask for a court injunction against the airlines.
- Take the fight to Congress by introducing legislation to hold the flight time to eight hours.

► **Safer Operation**—In its majority opinion, CAB held that the nonstop operation is safer than one of comparable length involving intermediate stops. The Board also found:

- Original 8-hr. rule was adopted in 1931 for earlier aircraft with "primitive instrumentation, few and unreliable radio navigation aids and shorter range requiring frequent landings."
- Application of the 8-hr. rule to DC-7 or Lockheed Constellation 1049 transcontinental nonstop operations is not necessary in the interests of safety and that its continued application to these operations "would be unreasonable."
- International 12-hr. flight time regulation, effective for nine years, has not resulted in a decrease in safety. In many respects the transcontinental nonstop flight parallels the most favorable operations in overseas air transportation.
- Waiver of daily flight time limits will not increase the monthly or weekly flight time limitations, which remain unchanged. Only effect it will have is to increase the flight hours, which may be scheduled with respect to any flight crew member beyond the present 8-hr. limitation.
- Waiver will permit pilots to enjoy more total time off since their monthly maximum flight time may be logged in 10 days under the waiver provision, whereas 15 days otherwise would be required. Five additional days off for rest and relaxation definitely contributes to overall safety.
- While extending the duration of any given flight will tend to increase the possibility of accident, exposure to accident is caused by many factors other than flight duration.
- A nonstop, high-altitude flight of 9 or 10 hr. duration may be even safer than one of somewhat shorter duration, which involves several intermediate takeoffs and landings with their attendant involvement in traffic and weather plus additional ground duty time.
- A memorandum dated May 21 from Civil Aeronautics Administrator Fred B. Lee advised that CAA would have no objection to such a waiver.

► **'No Factual Evidence'**—Member Adams, in his dissenting opinion, said: "A waiver of a long-established safety rule should be granted in only those few situations where there is an emergency or where actual operations have encountered difficulties under the regulations which clearly were not foreseen at the time the regulations were adopted."

He added that the original petitioner (American) has not demonstrated the existence of either an emergency situation or a situation which was not anticipated, both at the time the regulation was adopted and on or before the beginning of its nonstop transcontinental flights.

Adams said that the petitioners have offered "little or no factual evidence" indicating that the highest possible degree of public safety "will not be compromised by a grant of the waiver."

Granting the waiver, he said, puts the Board "in the unfortunate position of condoning past and continued violations of its own safety regulations where such violations were not justified and in fact where they should have been foreseen and avoided."

As to improvements made in aircraft in the 23 years since the 8-hr. regulation

went into effect, Adams said "none of these improvements, taken singly or cumulatively, has simplified the physical control and mental application exercised by a pilot."

Member Lee pointed out in his dissent that the Board in 1950 ruled against an extension of the flight rule from 8 to 12 hr., as proposed by the Bureau of Safety Regulation.

Again in 1952, he added, "the Board decided to further examine the question of flight time limitations with respect to long distance nonstop operations. . . . At the request of both the Air Line Pilots Assn. and Air Transport Assn., the oral argument was postponed indefinitely to permit the development of a joint proposal. No such proposal has ever been submitted to the Board."

► **Liable to Fine**—Approval of the waiver gives American the right to continue its DC-7 westbound nonstop operation without violating the regulations. Since June 1, AA has been liable to a maximum $1,000 fine for each DC-7 flight that ran over 8 hr.

A fine cannot be assessed without Board approval.

In its majority opinion, CAB reported that American's westbound flights have run "generally in the neighborhood of 8 hr. 43 min."

"Whatever may have been the situation since June 1 as to violations by American," CAB said last week, "the Board by its action herein in no respect condones or excuses any violations which occurred. The Board would not be warranted in denying the relief sought as to the future."

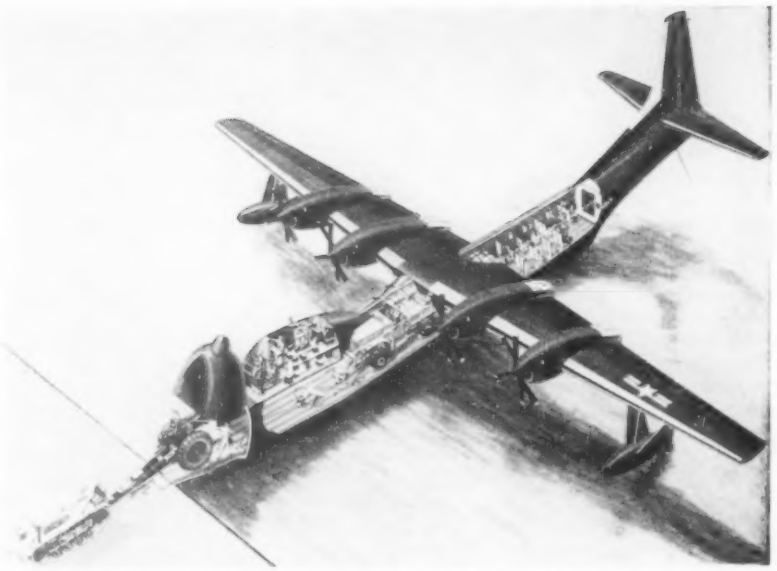
BEA Extends Tests Of Copter Operations

British European Airways has inaugurated Bristol 171 helicopter passenger service between London and Southampton, this is the latest step in the company's program of experimental copter operations.

The airline is operating two round-trip flights Monday through Friday, one from London airport and one from Northolt. Scheduled flying time is 49 min., with the services connecting in London with BEA flights to and from Glasgow and Belfast.

BEA first introduced helicopter passenger service between Cardiff and Liverpool in June 1950. A year later the service was transferred to the Birmingham-Northolt-London airport route. The experiments were completed in April 1952, and the copter services withdrawn.

In July 1953, also with the Bristol 171, BEA inaugurated the first all-British regularly scheduled helicopter freight service between London and Birmingham.



CLEAR, SINGLE-LEVEL DECK makes possible easy handling of large, bulky equipment.

Navy R3Y Becomes 'Flying LST'

By William J. Coughlin

Miami Beach, Fla.—Convair has released first details of the R3Y-2, a bow-loader version of the Navy's R3Y water-based turboprop transport (AVIATION WEEK Jan. 25, p. 22).

Hydrodynamics engineer Ernest G. Stout of the San Diego Division told the Aviation Writers Assn. convention that the new aircraft is the "last piece" in a complete Navy weapons system—"every element of which is now flying."

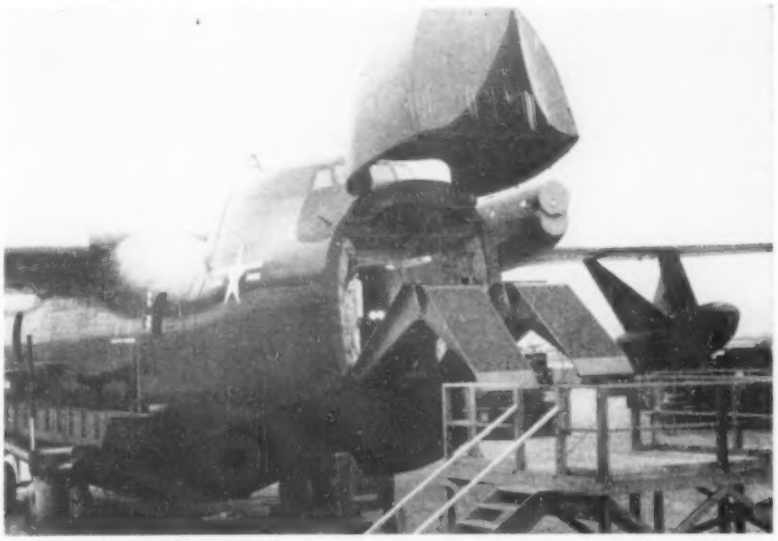
► **'Flying LST'**—Bow of the R3Y-2 opens upward to permit extension of a ramp upon which troops or loaded vehicles can debark directly. Company terms the plane a "flying LST."

Range is more than 2,000 mi. and speed is rated close to 400 mph., with a rate of climb faster than many World War II fighters. Both the R3Y-1 and R3Y-2 are scheduled to go into service late this year on the Navy's transpacific routes.

Stout describes the new aircraft as "faster than a DC-7 . . ."

► **24-Ton Payload**—The 80-ton airplane can carry 24 tons of cargo. The main cargo deck is 88 ft. long and more than 9 ft. wide. Bow door opening is 8 ft. 4 in. wide and 6 ft. 8 in. high. Like the R3Y-1, the new version also has a 10-ft.-wide door on the aft port side for dock loading of cargo.

Cargo deck extends back from the



R3Y-2 NOSE SWINGS UP, twin ramps unfold. Bow opening measures 80-in. x 100-in.

bow door on a single level unbroken by bulkheads. This was achieved by placing the entire five-man flight crew on a higher deck in the bow than in the R3Y-1.

Elimination of bulkheads from the main cabin was made possible by a multicellular arrangement of watertight bulkheads that extend upward only to the floor level while blocking the hull off into many cells.

The main deck is made of extruded magnesium for strength without excessive weight.

▶**Amphibious Operation**—Stout discloses that Convair and the Navy began work on the new weapons system after the first atomic bomb was dropped on Japan. It then became obvious, he says, that the vast amphibious assaults of World War II could never take place again.

Mobility and dispersion now are required for protection from nuclear attack, he asserts.

"Airstrips do not fit into this picture for they automatically concentrate forces," Stout says.

Convair therefore has concentrated on eliminating the airstrip from amphibious-type operations, he reports. Three Convair aircraft fit into this new weapons system:

• **XF2Y Sea Dart,** supersonic amphibious fighter that can base on an assault beach without requiring an airstrip.

• **XFY-1 Pogostick,** a vertical takeoff fighter that can operate from assault ships or from a beachhead.

• **R3Y-1 and R3Y-2** transports for water-based logistic support.

The R3Y-2, which requires no U-docks and can unload directly onto a beach, is the "ultimate in the transportation of goods," Stout comments.

The bow-loader is equipped with a stern anchor similar to that of an LST to keep it headed straight into the beach during unloading operations. Up to 40% of the approximately 22,000 hp. of the four Allison T40 engines can be employed in reverse thrust to back the aircraft off the beach after unloading.

▶**First Flight**—The R3Y-2 can transport any of the equipment of a Marine division with the exception of the large M-26 tank. It can carry four 155-mm. howitzers, three two-and-a-half-ton trucks, six jeeps or two half-tracks.

The bow-loader can be fitted with 103 rearward-facing seats for transport operations or with 92 litters for hospital excavation use.

Both versions of the R3Y are air conditioned and pressurized.

Some of the original Navy production order for R3Y Tradewinds have been converted to the R3Y-2 bow-loader version. First of these is scheduled for its initial flight soon.

Labor Demands

• IAM to ask 35-hr. week for aircraft employes.

• Union also wants higher wages, fringe benefits.

What aircraft manufacturers can expect in the way of labor demands when contracts come up for renewal next fall was pretty well outlined at an International Association of Machinists (AFL) meeting this month at Atlanta, Ga.

The union will demand a 35-hour work week with no reduction in pay, plus substantial wage increases and fringe benefits.

▶**Other Demands**—The IAM is not ready to tip its hand yet on figures in connection with "substantial" wage increases, but they outlined some other demands that will be made on management:

• Liberalized vacation and holiday programs. The union will ask for eight paid holidays as a nationwide standard: Jan. 1, Feb. 22, Memorial Day, July 4, Labor Day, Thanksgiving and day after, and Christmas. Vacation demand: one hour vacation for every 20 hours worked.

• Medical and health programs to be paid in full by employers in areas where permitted by state law. (California law requires 5% participation by the worker.)

• Elimination of job evaluation formulas as the means of determining how much a job is worth. The union wants pay scales set according to job description and not by the present point system formula.

IAM is shooting for a nationwide agreement similar to the contract recently concluded between Local 889 and Spartan Aircraft Co., Ft. Sill, Okla., that precludes the company from initiating new job descriptions or modifying old ones, unless and until such are agreed to by the union.

The IAM thus far is not ready to go to the mat over retirement benefits or guaranteed annual wages.

▶**130 Delegates Attend**—The IAM meeting was sponsored by District 33, bargaining agent for Lockheed-Marietta's 11,500 employes, and was attended by 130 delegates representing the bulk of the aircraft industry's union workers. It was the third annual International Aircraft-Guided Missile Conference of the union.

Chief business of the three-day session was to set demands that will be made in the fall when a majority of union contracts with aircraft companies are up for renewal.

Jesse C. McGlon, Atlanta, IAM regional vice president, says the shortened work week would result in regaining full employment in the aircraft industry. Based on union figures, the industry now is employing only about 80% of the professional aircraft workers available.

▶**How Union Figures**—The IAM says, for instance, that dropping back from the current 40-hour-plus overtime week to a 35-hour no overtime week at Lockheed-Marietta, would require the company to hire additional employes to meet production schedules.

They would pick up the 500-odd dropped since last fall, plus about 1,000 more. Cost to management would be considerably greater but would be offset slightly with abolition of overtime, the union argues.

Inasmuch as other aircraft companies would be forced to take similar steps, union officers figure the total number of aircraft workers would be increased some 15% or more. Thus it would result in a larger force of skilled aircraft workers in event of an emergency. At that time, the union voluntarily would revert to the 40-hour week.

Delegates at the meeting—business agents and chief officers—represented districts and locals having contracts with Douglas, Lockheed, Convair, Boeing, United Aircraft, Republic, Fairchild Guided Missile, McDonnell and Convair-Ft. Worth. Canadian delegates were present from A. V. Roe Canada, Ltd., and Canadair.

Hughes Expands F-98 Guided Missile Plant

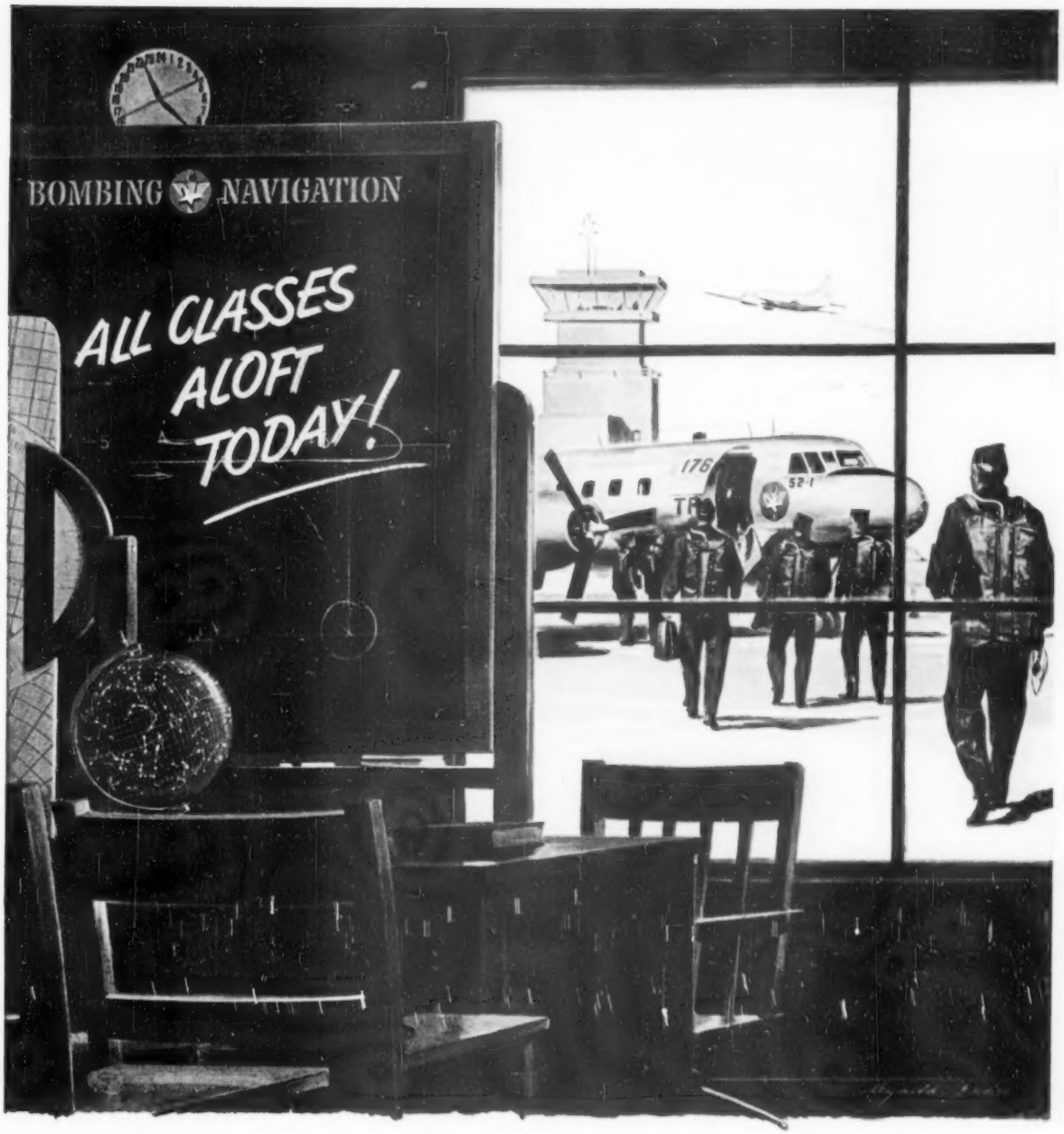
Hughes Aircraft Co. is spending $1,616,600 to expand its guided missiles plant at Tucson, Ariz., a project calling for 22 buildings on a square mile of desert.

This will bring to more than $14 million the amount the government has allotted Hughes plants at Tucson for manufacture of the F-98 Falcon, air-to-air missile carried by Convair's delta-wing F-102.

As a part of the new development, the 22 buildings will include three long concrete, brick and cement block plants. One will be 540x50 ft., another 280x80 ft. and a third 100x50 ft. There also will be 12 poured-concrete igloo vaults in the area.

The Hughes plant is adjacent to sprawling Davis-Monthan Air Force Base, home of B-47 squadrons and jet interceptors. It also is accessible to Ft. Huachuca, site of the new Signal Corps electronics proving ground.

The Tucson electronics plant has a work force of nearly 3,000. Parent plant of Hughes aircraft is at Culver City, Calif. Hughes is said to have an air defense weapons backlog of $600 million.



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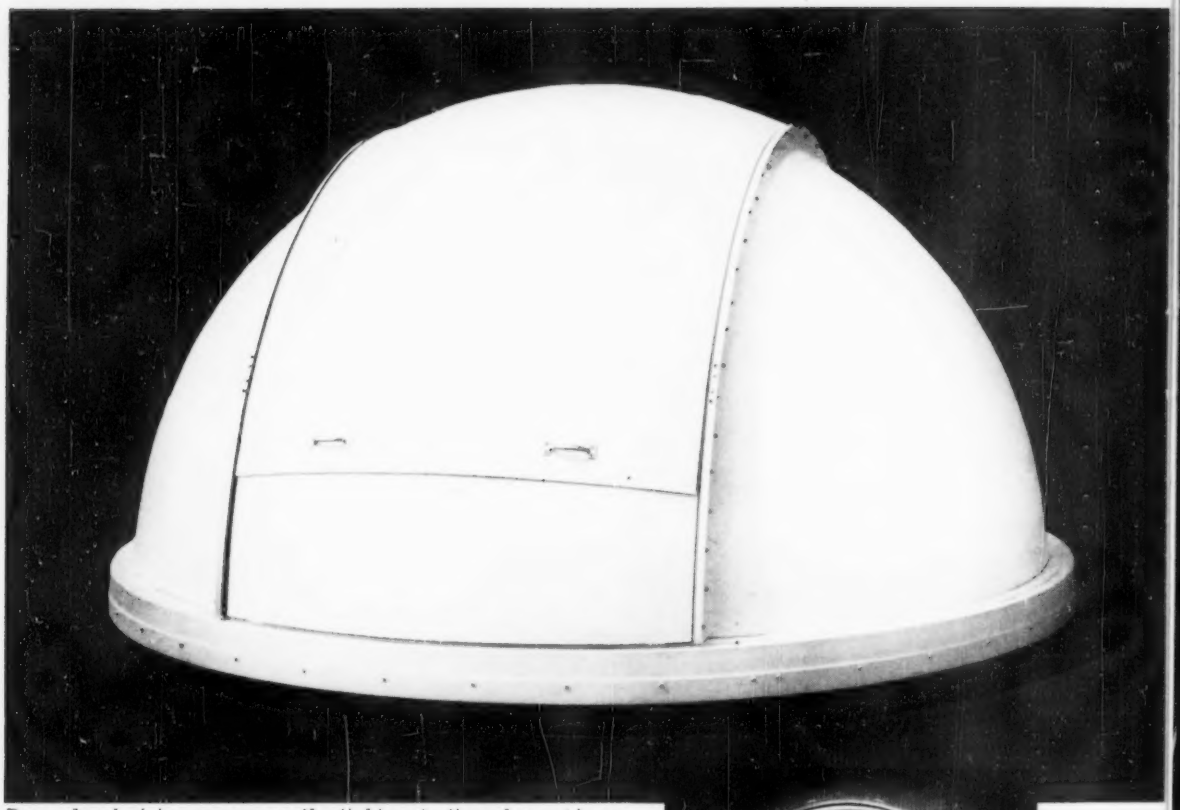

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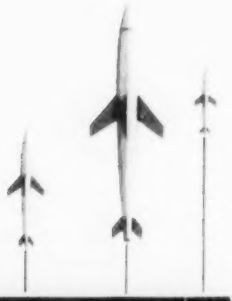

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Defense Sets Up New Industry Advisory Unit

Mundy I. Peale, president and general manager of Republic Aviation Corp., has been appointed to a new Defense Department Procurement and Production Advisory Committee.

The committee is expected to facilitate agreement between the Pentagon and defense industry on procurement regulations.

Headed by Warren Webster, Jr., director of procurement and production policy in the office of Assistant Defense Secretary (Supply and Logistics) Thomas P. Pike, the group is composed of business executives representative of the industries heavily engaged in defense work.

In addition to Peale, members are:

Ross Nichols, executive vice president of Weston Electrical Instrument Corp., Newark, N. J.

Stanley E. Bostwick, vice president of Edo Corp., College Point, N. Y.

J. R. L. Johnson, Jr., general counsel for Hercules Powder Co., Wilmington, Del.

Ward Stringham, vice president of General Electric Co., Washington, D. C.

James F. Lovett, defense contract administrator for Chrysler Corp., Detroit.

Joseph H. Gillies, vice president of Philco Corp., Philadelphia.

Howard Isham, vice president and treasurer of U. S. Steel Co., Pittsburgh, Pa.

James F. Forster, vice president and assistant general manager of Vickers, Inc., Detroit.

The committee held its first meeting June 4, but no announcement was made of topics discussed. Sections of the armed services procurement regulations currently undergoing revision include important policies involving cost allowances (Sec. 15) and patents (Sec. 9).

▶ **Patent Wrangle**—Indications at Webster's office are that the revised policy on patents will be ready for distribution in about a month and that the cost allowance regulations will follow.

Proposed changes in the patent section have been circulated to the aircraft industry for comment as well as to the armed forces. It is expected that the new rules will more fully define the area where the government can demand full or part ownership of patents as part of a defense contract.

Wrangle in this field comes partly as a result of the feeling of some small businesses that they should get patent rights when they are granted subcontracts. Prime contractors generally disagree, argue that the designer-developer needs protection as an incentive. They maintain that the government, by not releasing patent rights to a competitor or potential competitor, more fully will encourage development of an efficient weapons system.

▶ **Major Question**—Proposed cost allowance regulations have been revised at

New S.F. Terminal Doubles Capacity

First view of new air terminal facilities being built at San Francisco at a cost of more than $14 million. The new building is designed to handle 5 million passengers annually, double the number served during 1953 by its predecessor. The terminal will be dedicated and the field designated an international airport Aug. 27.

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Mr. Triest, airline transport pilot #29648, soloed in 1930. He commutes between Tulsa and New York in a Bonanza. He has flown over 1400 hours, more than 225,000 miles on Continental engines, in the past three years.

P.S. The $88.00 went for a rotating beacon from Central Aero Supply, Woodbury, New Jersey.

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least twice. Observers say the new advisory committee may be called upon to help settle a major question involving the allowability of advertising costs on a defense contract.

The existing regulation says such costs are allowable, among other cases, when the advertising is placed in a technical or trade journal that disseminates valuable information to the industry and is purchased to provide financial support for the publication. As the suggested revisions to Section 15 have been passed for comment, this condition has been deleted and now, it is understood, replaced in the regulation.

▶**Policy Recommendations**—Webster's office indicated that many of the current questions would be decided by the new armed services Procurement Regulation Advisory Committee.

Pike's announcement of the committee's makeup said the group will "provide advice and recommendations to the Assistant Secretary of Defense on matters of broad policy and on important aspects of procurement and production matters pertaining to the Department of Defense."

International Airline Transactions Gain 12%

Higher traffic volume on international routes was the principal factor in producing an increase of nearly 12% in the value of world airline transactions handled by International Air Transport Assn.'s clearing house during this year's first quarter.

IATA reports total transactions cleared during the first three months of 1954 amounted to $56,310,800, compared with $50,386,000 for the first quarter of 1953.

▶**Member Increase**—Sir William P. Hildred, IATA director general, attributes part of the increase to the larger number of airlines that used the clearing house during the quarter. Membership increased to 41 with the addition of Malayan Airways, Ltd., in March.

Four other carriers added during January were Airwork, Ltd., Air Veitnam, Japan Air Lines and Jogoslovenske Aero Transport. These new memberships were reflected in the increased total business, IATA officials say.

▶**Turnover Gains**—Monthly turnovers during the quarter, compared with the same period of last year: January, $18,158,900, a 5.3% gain: February $16,508,000, higher by 6.8% and March, $21,643,900, up 22.5%.

Interline transactions carried out through the U.S. Clearing House, in which international settlement is accomplished by U.S. domestic airlines, totaled $2,220,000 during the first quarter, as against $2,112,000 in 1953.

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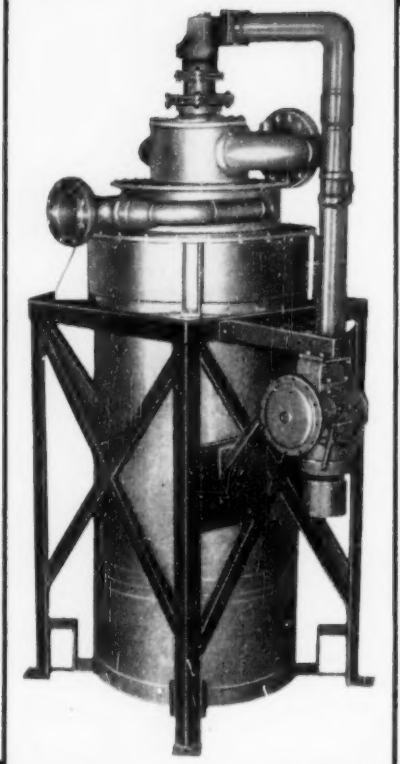

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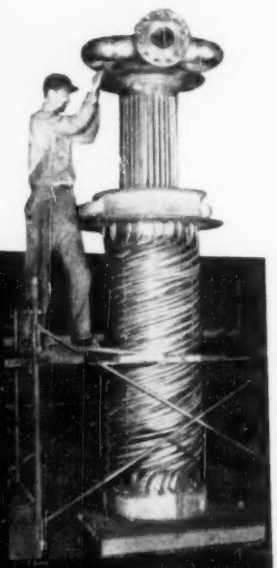

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AF Subcontractors Face Stiff Competition

Aircraft subcontractors who want to stay in business will get the chance, according to the Air Force, but they must face the challenge of real competition to do it.

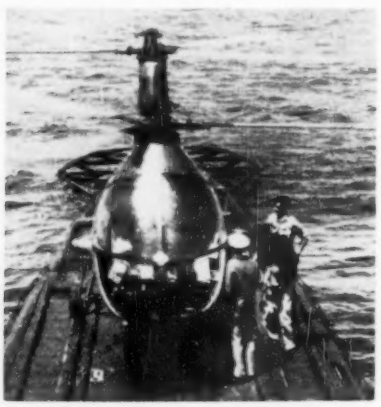
Presenting 1955 fiscal year budget estimates to the Senate Committee on Appropriations, Brig. Gen. Thomas P. Gerrity, USAF director of procurement and production engineering, said the Air Force intends "to maintain a reasonable distribution of business throughout the aircraft industry by encouraging those contractors having the largest amount of business to subcontract work to the maximum extent economical, thereby providing other contractors with low-dollar backlogs an opportunity to participate on a competitive basis."

Gerrity made it clear that efficiency would be the prime consideration in "offering to all business enterprises, large and small, full opportunity to produce those items we require."

He said USAF encourages small business but added that "we will use competition in negotiation and multiple awards wherever appropriate."

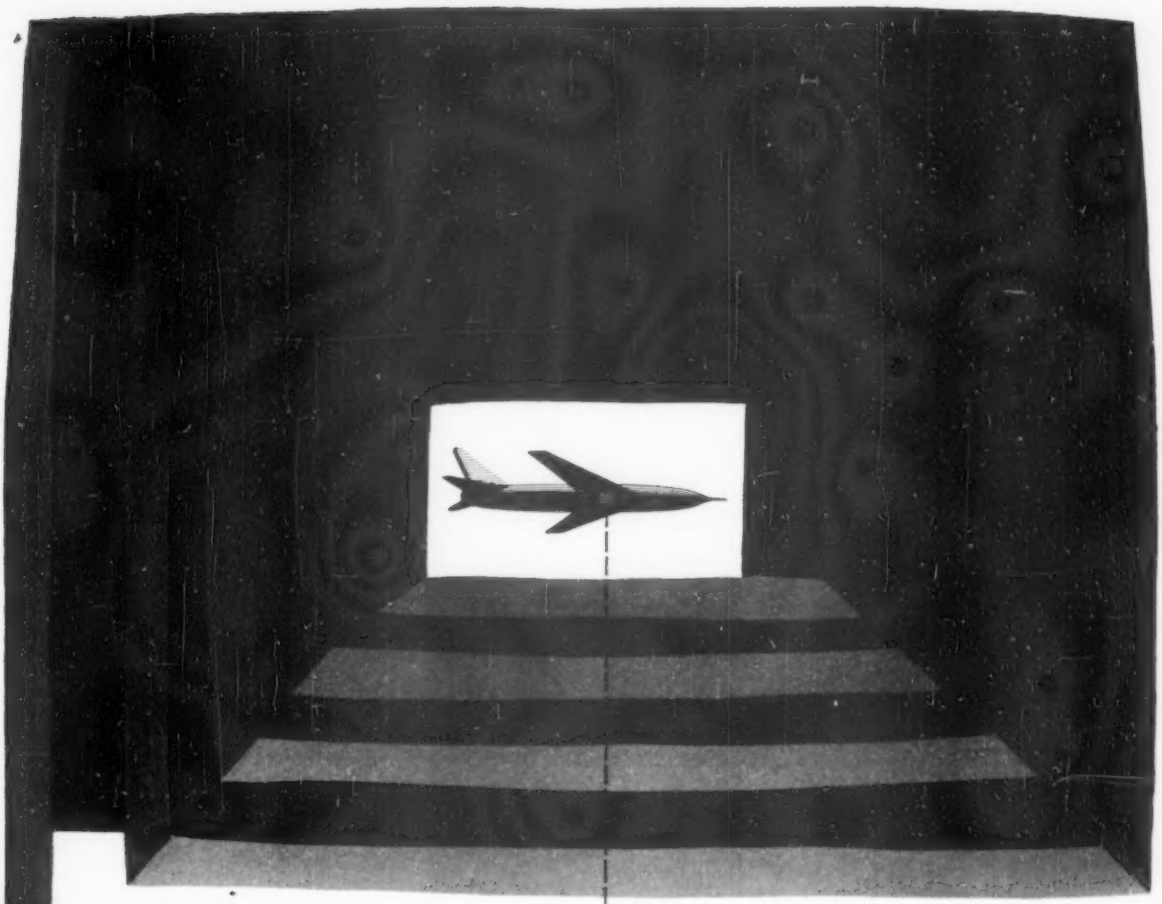
His statement stood in contrast to a growing trend among aircraft manufacturers to cut down on subcontracting. With industry pressed by USAF for greater economy and continually made more conscious of competition, observers do not expect to see the trend reversed.

General feeling in the industry is that efficient operators will be rewarded with contracts, even if they are forced out as prime contractors.



Copter on Sub

Small tandem-rotor Piasecki HUP-2 helicopter has landed in the aft deck of a submarine, pointing up rotary wing craft's ability to serve fleet units. This copter belongs to West Coast Navy helicopter squadron HU-1 which handles utility missions with the Pacific Fleet.



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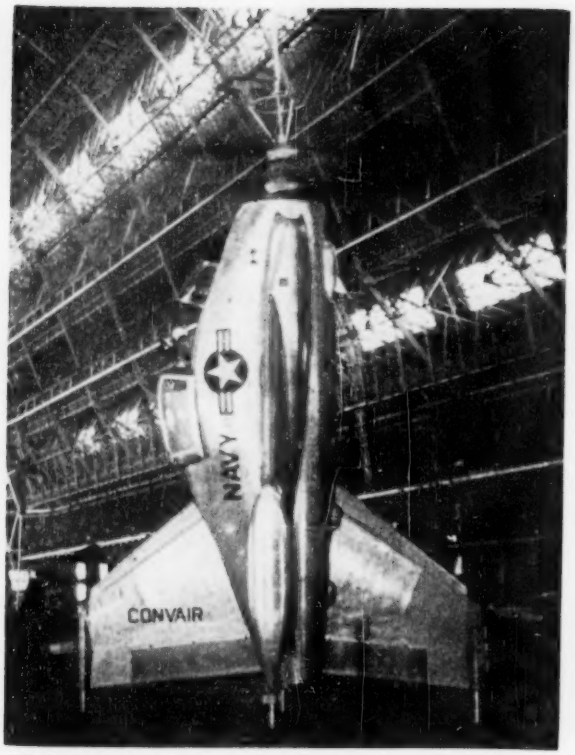
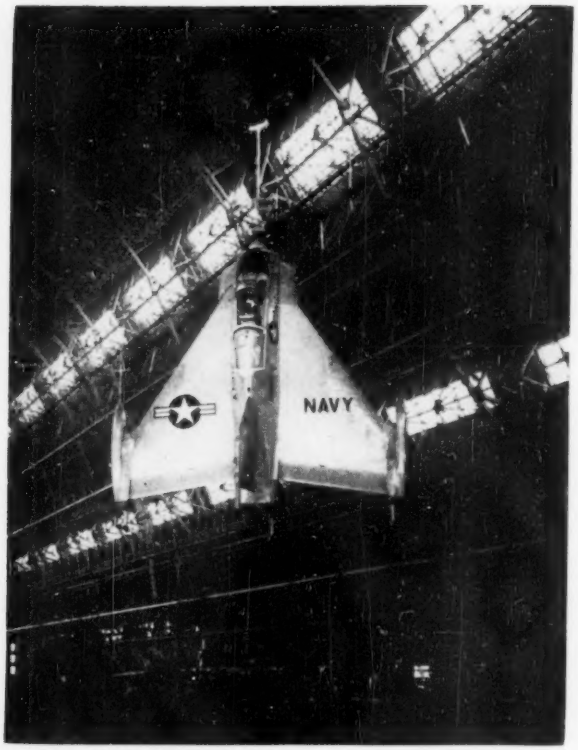
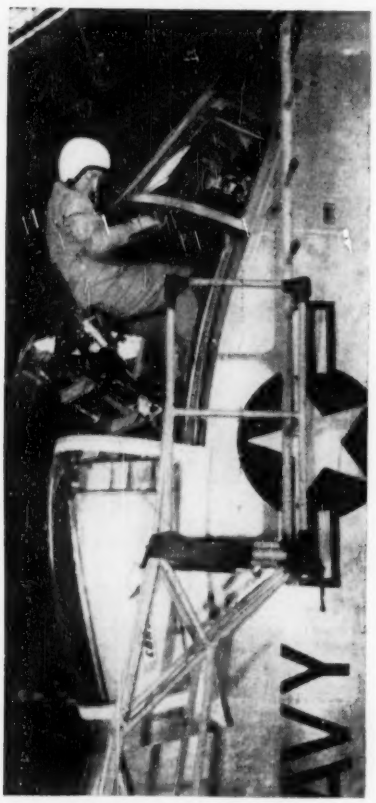


CONVAIR XFY-1 begins power turnup for tethered tests, then . . .



TAKES OFF VERTICALLY at a rate of 3 to 4 ft. per sec. . . .



TEST PILOT Coleman climbs into cockpit.

Convair VTO Fighter

By William J. Coughlin

Moffett Field, Calif.—Convair's revolutionary XFY-1 vertical takeoff fighter was poised for free-flight trials last week after more than 20 "tethered" tests during which the startling new aircraft (AVIATION WEEK Mar. 22, p. 14) actually flew inside a giant Navy dirigible hangar.

Newsmen watched pilot J. F. (Skeets) Coleman make three vertical takeoffs and landings during a press demonstration here June 2. Although still in its unusual tethering rig, the XFY-1 "Flying Pogostick" received no lift or control from the slack cables.

The aircraft was entirely under the control of the pilot as he eased its eight-ton weight off the hangar floor, climbed slowly to a height of 50-60 ft., demonstrated its maneuverability in the vertical position, then descended gently to a tail-first landing.

Convair planned to move the plane outside the Moffett Field hangar following the XFY-1's "leashed" tests. Before the cables were removed, tethered tests with the giant hangar doors open were made to check crosswind handling characteristics.

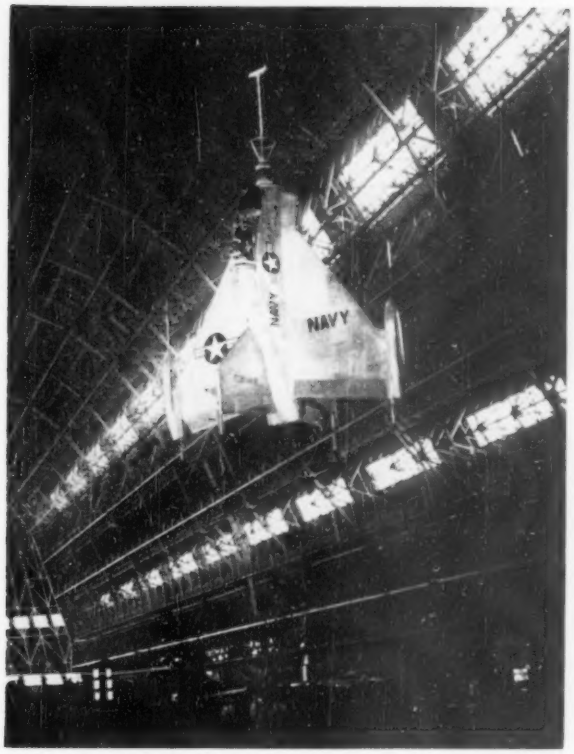
▶**Good Maneuverability**—During the press demonstration, Coleman danced the silver fighter at the end of its leash with an ease that indicated very good maneuverability in the strange nose-up position. He maneuvered freely about the hangar to the extent possible within the 60-deg. cone that had its apex at the cable drum 184 ft. above the hangar floor.

His strange craft looked like a toy inside the vast hangar built to house the dirigibles USS Macon and Akron. Coleman climbed a yellow ladder to the cockpit and slipped into the seat, which was tilted out and at an angle for improved visibility. The seat is electrically controlled by a cockpit switch. His feet reached above him to the rudders as he settled into the unusual position.

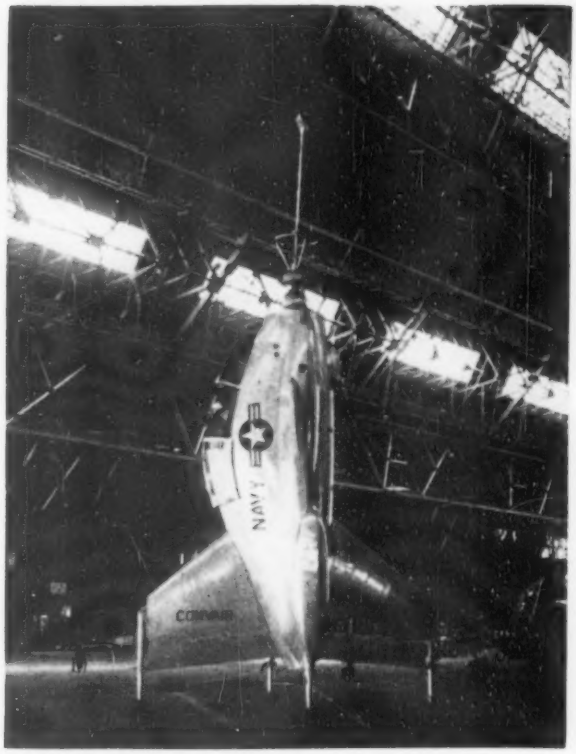
"You don't fly this one by the seat of your pants," he says. "You fly her by the back of your neck."

▶**Power On**—After a cockpit check, he reached forward to the engine controls and the starter for the Allison YT40-A-14 began to whine. The Curtiss-Wright Turboelectric contra-rotating propellers turned sluggishly as the whine deepened into a roar.

The props slowed almost to a standstill and then began spinning swiftly as Coleman engaged the turbines. He



MANEUVERS to the limit of its cables under the hangar roof . . .



SETTLES BACK to feather-soft landing on its four oleo struts.

Prepares for First Free-Flight Tests

kicked out the starter leads with a cockpit control and carefully checked over his instrument panel.

Looking down and off to his left wingtip, the Convair pilot slowly moved his throttle forward until almost imperceptibly, its four long oleo struts lengthening, the XFY-1 began to rise. The roar increased until the thunder of the turboprop engine, with its 5,500 static hp., shook the hangar.

Then slowly—with the six-blade, constant-speed propeller spinning at 1,000 rpm.—the four small wheels lifted off the hangar floor and the VTO fighter climbed at a rate of 3-4 ft./sec. off to the right and to a height of 50-60 ft.

From positions under the roof, observers could see Coleman keeping the control stick in almost constant motion as he maneuvered to the limits of the cables on each side, turning back and forth in a 180-deg. arc to demonstrate the ease of handling.

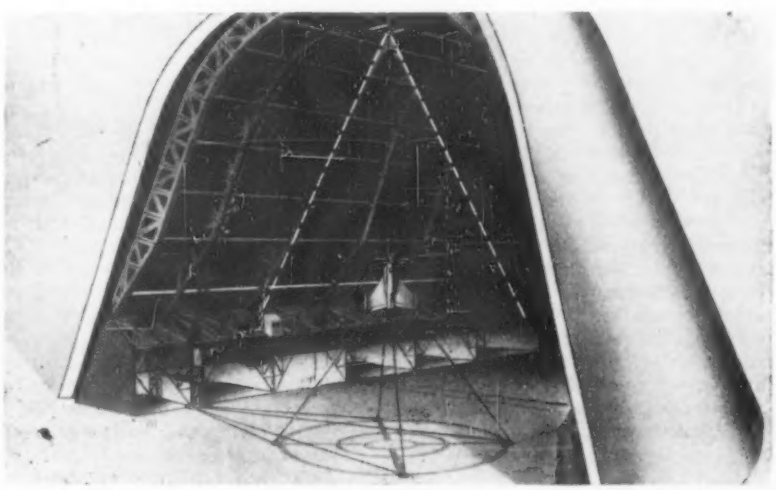
After four minutes in the air, he lowered the fighter to a feather-soft landing in the circle marked on the hangar floor. Two similar takeoffs and landings followed.

Only once did Coleman signal for aid from the tethering device and that was after one of the cables to the tail became snagged on a pulley wheel and accidentally drew taut as he maneuvered the "Pogostick" during the mid-air demonstration.

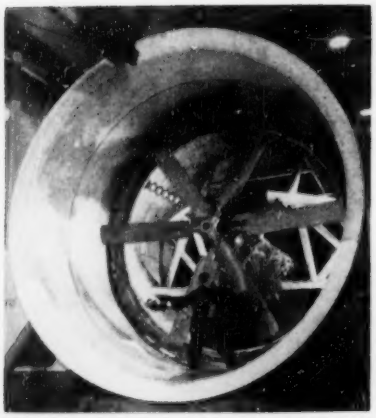
▶ **Conventional Controls**—Although he spent many hours flying helicopters in preparation for his assignment, Coleman—who calls himself the "most pampered pilot in the world"—says he does not believe such training will be necessary for pilot transition from conventional aircraft.

He explains that the controls are conventional in every sense. If the pilot wishes to bring the nose "up" he pulls back on the stick, even though the position of the aircraft may be vertical.

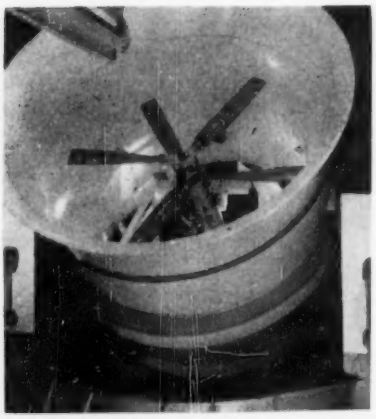
"With your feet up in the air, it



CABLE RIG is shown in artist's drawing. Broken lines outline maneuverability cone.



WINDTUNNEL, developed by Allison for VTO turboprop testing, dwarfs employe.



TEST DEVICE rotates 90 deg. on two large bearings to vertical or horizontal positions.

isn't always easy but I was surprised to find that when you are concentrating you don't notice the awkward position," Coleman says.

It is easy to trim the VTO fighter even in the vertical position, the Convair pilot reports, adding that he has flown it for short periods with his feet entirely off the rudders.

▶**Tethering Rig**—Unlike its Lockheed counterpart, which has temporary wheels installed for taxi testing in the horizontal position, the Convair aircraft could be tested from the first only in vertical flight.

For this reason, the novel tethering rig was devised to enable Coleman to make his initial flights within the protecting network of cables. These could restrain the unusual craft in event of loss of control or prevent it dropping to the concrete hangar floor if the engine failed.

The system basically is made up of cables strung through pulleys and hooked into a drum controlled by an electric motor and brake. A counterweight running on a track down one wall of the hangar kept the nose cables taut to prevent propeller fouling when the aircraft was rising under its own power.

During these so-called "taxi-tests," another cable ran from the tips of the VTO's wings and fins through a tension regulator and up the wall to the bottom of the counterweight.

Several safety devices were built into the system. If the plane dropped at more than the preset speed of 5-10 ft./sec., a sensing mechanism attached to the drum cut in the brake and halted the unwinding cables. The same control went into operation if the plane dropped within 35 ft. of the floor.

In order to confine the landing area during early tests, the trailing cable could be tightened automatically when the aircraft was within 20 ft. of the floor. In later testing, this cable was loosened to permit the plane to land anywhere on the hangar floor that was within the base of its operating cone.

The rig, built by Southern Engineering and Construction Co. of Long Beach, Calif., not only permitted vertical takeoffs and landings but also twisting in the vertical attitude within a 270-deg. arc. The hangar, longer than a CV-type aircraft carrier, offered a vast unobstructed area for the indoor flights. Built in 1933 to shelter the airship Macon, it is 1,133 ft. long, 308 ft. wide and 198 ft. high.

▶**Modified Engine**—Allison representative Guilford C. Pearce reports the XFY-1's Allison engine will develop 7,100 hp. at maximum velocity, although it is rated at 5,500 equivalent shaft hp. when the fighter is static. This, he says, is about three hp. for every pound of engine weight.

Allison faced two problems in adapting the T40 turboprop engine for the 550-mph. VTO fighter, Pearce comments. These were:

- Revisions necessary for the engine to operate satisfactorily in both the vertical and horizontal positions.
- Fineness of controls made necessary by the critical takeoff and landing periods.

Major changes were in the lubrication system. Oil pumps, lines and breathers of the T40 were rearranged. Reduction gear was modified, giving higher propeller revolutions and increasing the thrust. The control system was redesigned. Large size of the propellers also made it necessary to change the procedures for starting the engine.

A special test stand was built in the Allison plant at Indianapolis to accommodate VTO engines in either vertical or horizontal positions. Work on the prototype engine was begun in 1951, and engine testing began at Allison's Plant 2 in November 1952. The YT40-A-14 now has logged more than 300 test hours.

▶**Turbolectric Props**—Curtiss-Wright representative L. J. Charchian says the Curtiss dual-rotation turbolectric propeller on the XFY-1 is equipped with extruded hollow steel blades and incorporates single-unit forged hubs.

These, he says, are particularly adaptable to the structural requirements of the high-speed turboprop application. The outboard propeller is mechanically slaved to the inboard propeller through gearing and is controlled by a single stationary power unit, Charchian says.

"The simplicity and inherent reliability of the electro-mechanical control system offers definite advantages over more complicated propeller control methods and greatly simplifies the initial concepts believed necessary for turboprop control," he comments.

C. B. Carroll, XFY-1 project engineer, says the VTO fighter has been designed for easy production. There are eight pairs of bolts in each wing and the spars are forgings, he notes.

Philippine Leaders Seek More Jets

(McGraw-Hill World News)

Manila, P. I.—Jet planes and light naval vessels should form the bulk of U.S. military assistance to the Philippines and ground forces should be reduced correspondingly, Senate leaders here believe.

Philippine Senate Majority Leader Cipriano P. Primicias, member of the Foreign Relations and National Security Committee, confirms that such is the preponderant sentiment.

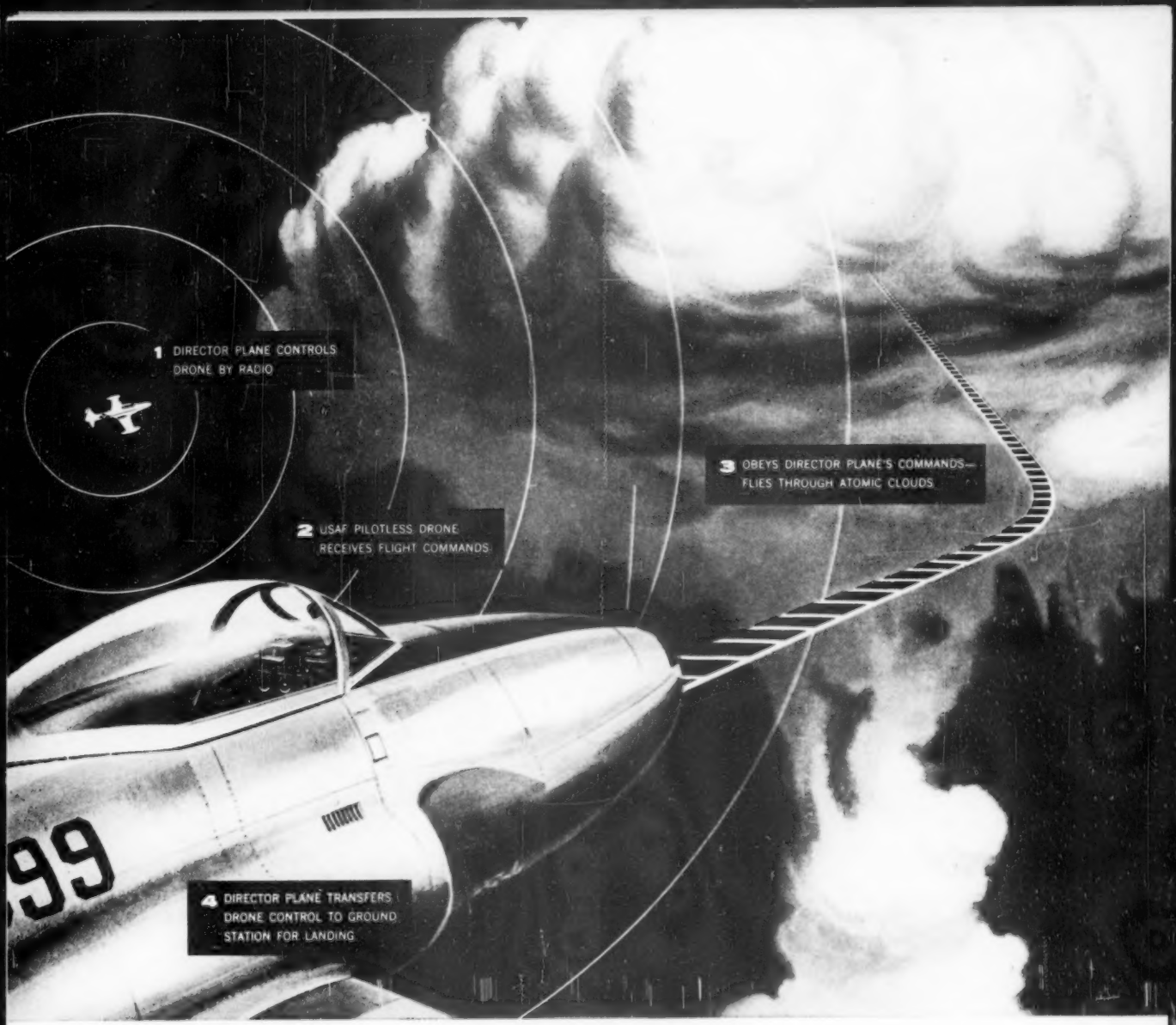
▶**Starvation Budget**—The Philippines air force has been starving on a budget of only about $8 million, with most military expenditures going into the ground forces because of the need for restoring internal peace and order.

Although planes have been supplied by the U.S., the budget is too small to take care of maintenance and operations.

PAF has not yet received any jet fighters or bombers from the U.S.

▶**Security Pace Defects**—Philippine senators are also pressing for a revision of the U.S.-P.I. security pact, claiming:

- The three-month notice period gives the U.S. an opportunity to back out if the islands become difficult to hold.
- Armed aid is confined to initial equipment and supplies and is subject to appropriations by the U.S. Congress
- U.S. retains title to the military equipment it gives the Philippines. Also, the Filipinos contest what they call the near-absolute ownership of military bases retained by the U.S. in the islands.


1 DIRECTOR PLANE CONTROLS DRONE BY RADIO
2 USAF PILOTLESS DRONE RECEIVES FLIGHT COMMANDS
3 OBEYS DIRECTOR PLANE'S COMMANDS— FLIES THROUGH ATOMIC CLOUDS
4 DIRECTOR PLANE TRANSFERS DRONE CONTROL TO GROUND STATION FOR LANDING
99

Pilotless Jets Penetrate Atomic Cloud in Tests

BRING BACK DATA PREVIOUSLY IMPOSSIBLE TO SECURE

THE STORY BEHIND THE STORY:

■ Mix the drama of atomic tests and pilotless flight and it's page one news. Such was the case when the U. S. Air Force thrust pilotless jet drones into the heart of atomic clouds and landed them safely – with their cargo of mice and monkeys – for scientific study by the Atomic Energy Commission.

■ The story behind the testing of the effect of radiation on animals is one of pilotless flight, "beep" pilots and precise Sperry controls. Lockheed QF-80 drones, specially equipped with Sperry remote flight control systems, fly through atomic clouds guided by radio and radar.

■ These drones are flown remotely by skilled USAF pilots who use "beep" boxes to command them – either from director planes in the air or control stations on the ground for take-off and landing. Under their radio commands the drone takes off, at the proper speed retracts its landing gear, climbs to the desired altitude, banks and turns and keeps the airspeed necessary to arrive at an exact point in the atomic cloud at a prescribed second.

■ This remarkable flight control system brings the drone through the awesome turbulence of the atomic cloud under complete control—on course and altitude. Returning to its airbase, the radiation-saturated drone lands as precisely as though a veteran pilot were at its controls.

■ Sperry is an old hand at pilotless flight. It developed the first guided missile—an aerial torpedo for the Navy – back in 1915. And since 1912, Sperry has been the leader in developing automatic flight controls for *piloted* flight. Sperry automatic pilots are installed on military and commercial planes the world over.

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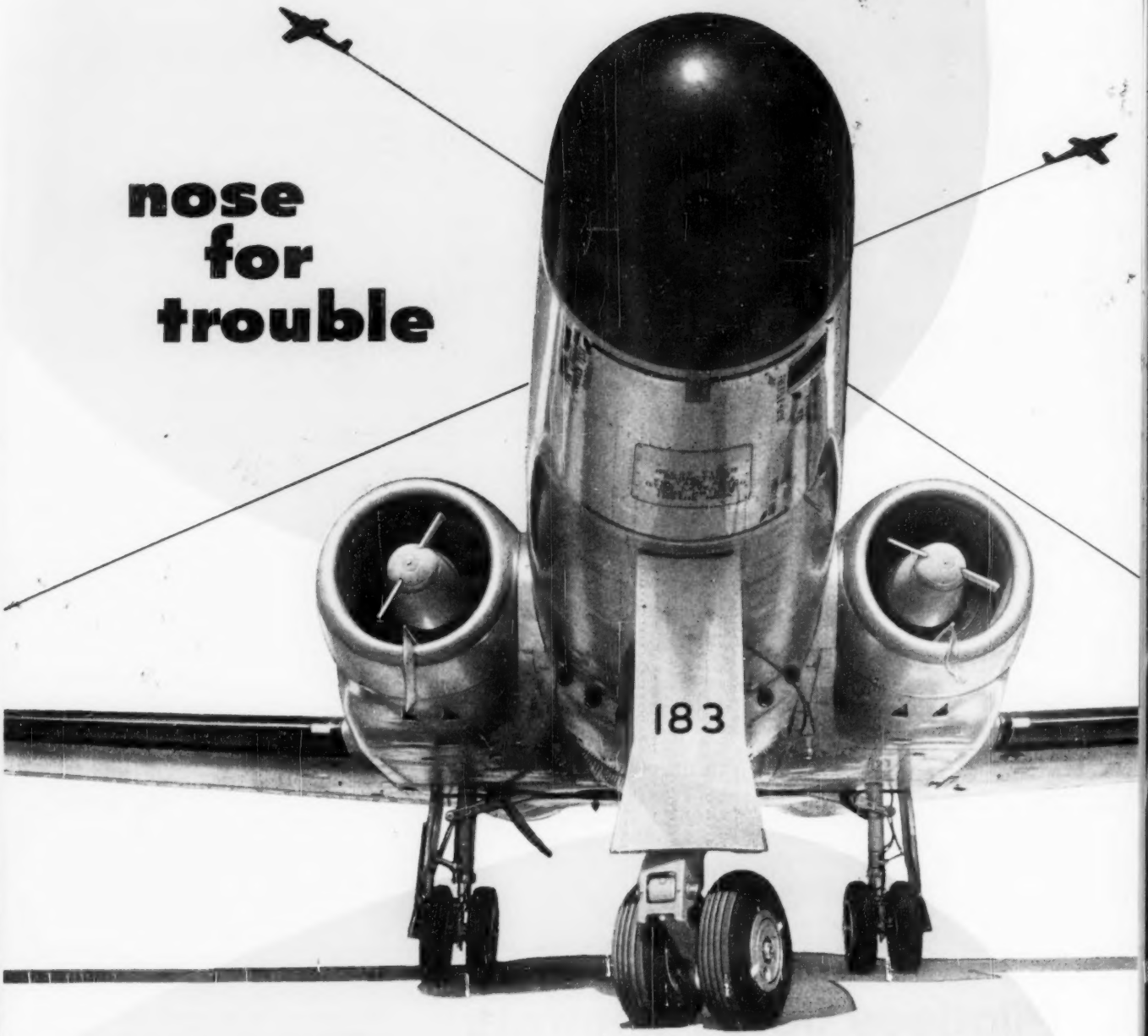
nose for trouble



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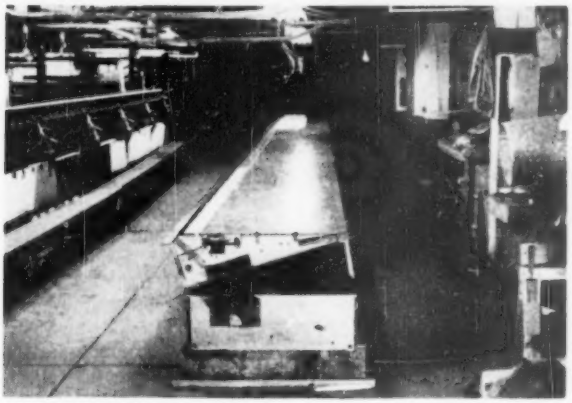
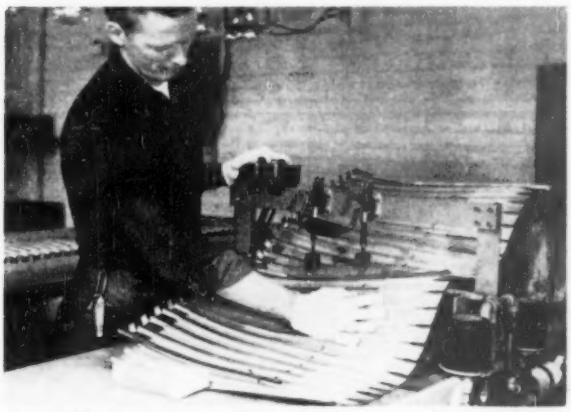
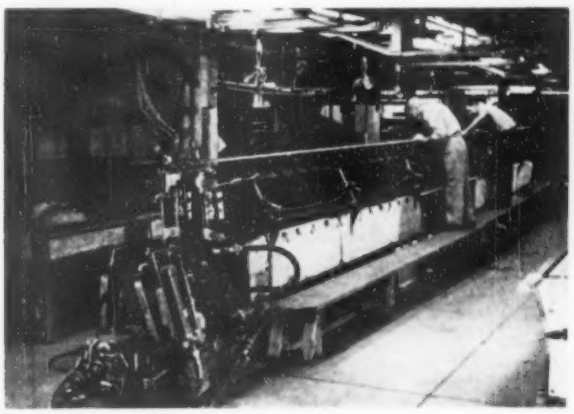


PRE-FORMING nose radius in the blade is done in this simple press. Skin and inner laminations are pre-coated with adhesive.

GLUING impregnated glass-cloth tape to corrugated aluminum alloy stiffener replaces hand application of many adhesive coats.



LOADING the mold, skin laminations and spar web are positioned before final heat curing of the complete XH-16A blade assembly.



BONDING stainless steel cap to stiffener beads is the next step. Cap carries chordwise bending and drag loads on the giant blade.

AF Gets XH-16A Laminated Metal Blades

By David A. Anderton

Clifton Heights, Pa.—Prewitt Aircraft Co. is now delivering its first laminated all-metal rotor blades to the USAF for eventual installation on the giant Piasecki XH-16A helicopter.

The blade structure is completely laminated of stainless steel with aluminum reinforcements, adhesive-bonded in a process originally developed by president Richard H. Prewitt for the smaller blades of the Piasecki HUP (AVIATION WEEK May 5, 1952). The basic blade shells, less inboard fittings, were built for $8.50 per pound, little more than one-half the cost of conventional aircraft structure. Prewitt believes the cost of the large blades can be comparable.

Looking ahead, there's a possible application of the method to the fabrication of control surfaces, tail groups or even complete wing panels. Emphasizing the point, Prewitt explains that industrial planners are worried about the amount of wasted metal in the machining approach to aircraft structure. "With this method, you don't make any chips," he says.

▶ **Statistics**—The 35-ft.-long blade has a 28-in. chord. It is made up of 60 to 70 pieces of 0.0088 in.-thick sheet laminated with adhesive in a hot-mold process.

Weight of each blade is approximately 380 lb., which can be held within plus or minus two pounds. That's a weight control accuracy of about 99.4%, achieved by weighing the sheets before the molding process and by using sheets alternately from the high end and low end of the acceptable range of thickness tolerances. Final chordwise and spanwise balance is maintained to less than 0.1% difference between blades.

Improvements in the original method have brought the working time per blade down to as low as 58 man-hours for the smaller HUP blade. Prewitt estimates a five-month lead time for quantity production of the big blades, compared to seven months for the HUP blades.

Improvements in the mold and adhesive-coating techniques have been made since the company delivered its first HUP blades. In the latter case, the laborious hand application of adhesive to portions of the blades has been super-

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seded by the use of adhesive-impregnated glass cloth strips which are daubed only once with adhesive. This replaces seven to 10 hand-applied coats and has speeded fabrication of rotor blades tremendously.

▶ **Blade Buildup**—The process starts with pre-coating of the metal sheet with Bloomingdale Rubber's FM-47 adhesive in a production machine developed by Prewitt engineers.

Stainless-steel skin and spar laminations are cut from coils of the coated stock and placed singly in a simple folding press made of plywood and metal. The press is then folded, forming the blade nose radius in each piece.

Meantime, the corrugated aluminum-alloy aft stiffener is laid out and adhesive strips are added to the contact areas. Stainless-steel caps are bonded to the stiffener bead of this corrugated section to provide additional strength to carry the chordwise loads on the blade.

▶ **Curing Cycles**—There are four stages in the molding process. In the first, where skin and nose laminations are tacked in the mold, a 15-min. hold under pressure at a temperature of 150F suffices.

Second stage assembles the spar web and angles and the root laminations. This also is a 15-min. cycle time at temperature and pressure.

Third stage assembles the trailing-edge stiffener assembly in the mold, and the cycle is the same as for both previous stages.

Final cooking is done with the mold clamped closed. The first cycle time is 15 min.; then the temperature is raised and held for 30 min. Pressure is released after the mold has cooled to 225F.

The times given above do not include heating and cooling of the mold. A typical complete cycle from cold mold to opened mold at the end of curing would be about 30 hr., corresponding to about four working days.

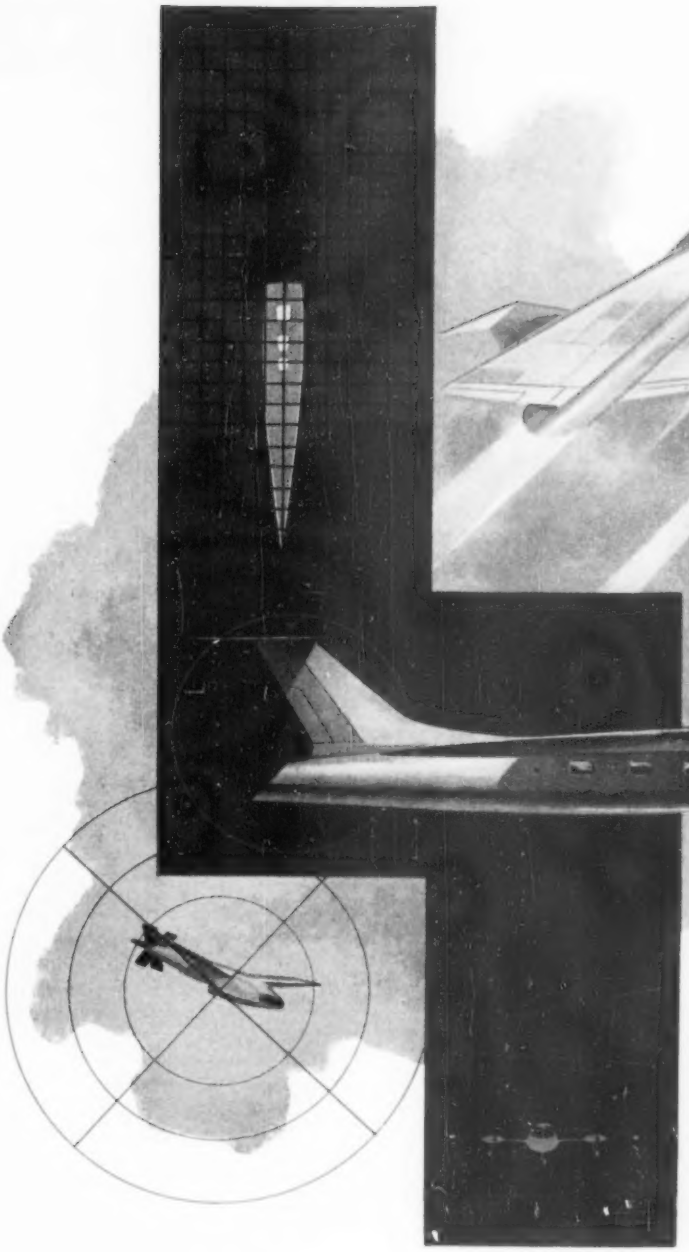
After removal from the mold, the blade is set in a holding fixture and drill jig which positions the holes for the hub-fork retaining pins. Additional laminated reinforcement pads are added around the drilled holes.

Tip of the blade is finished with a conventional drawn piece of 24ST aluminum alloy.

Final steps include inspection and static balancing of the blades.

▶ **Mold Improvement**—All molds used in Prewitt's processes are built of a large number of laminations which are punched out of steel about ⅛-in. thick. Stacked side by side, and held together with through bolts and heat pipes, these laminations make a versatile mold which can be twisted to produce twisted blades as desired, or varied in length.

The original molds built for the HUP



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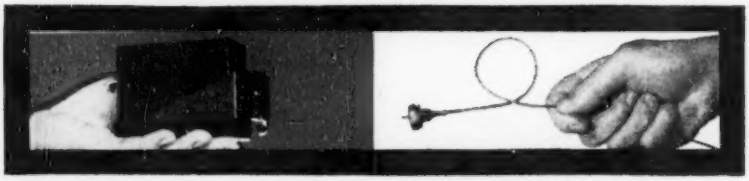


Thomas A. Edison, Inc.
INSTRUMENT DIVISION • 49 LAKESIDE AVENUE • WEST ORANGE, NEW JERSEY

blades have been improved by Prewitt. Now four feet longer than the early size of 16 ft., the molds have an improved system of support which Prewitt says makes alignment of the laminations an easier and shorter job.

▶ **Changes**–These are other specific changes in the mold and in the coating technique.

• **Cycle time has been reduced** to less than two hours, compared with the earlier time of two days.

• **Hydraulic mechanism** for opening and closing the mold replaces the hand operations necessary in the past.

• **Single silicone rubber pressure bag** replaces the three bags of the earlier mold design.

▶ **Prewitt Accomplishments**–These have been the specific accomplishments of the Prewitt molds:

• **Blades for four manufacturers**–American Helicopter, Cessna, Kaman and Piasecki–have been built with the same set of tools and molds.

• **Five different types of blades** have been built with these tools.

• **Three different materials** in different combinations have been used to make blades in these tools.

Prewitt currently is working on development contracts with the services for methods of checking adhesive bonds and for rotor-blade construction. Blades have been designed and constructed using titanium as the laminate; other designs employ honeycomb structure in the trailing edge section.

THRUST & DRAG

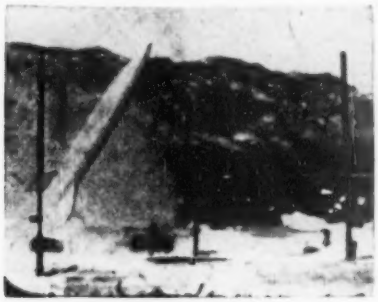
Cornell Aeronautical Laboratory has developed a new windtunnel technique to study what happens when a pilot jettisons a bomb or a wingtank. Using frangible bomb models developed by CAL's Materials Dept., the tunnel crews can study the trajectories of separation under conditions closely approximating those of full-scale flight.

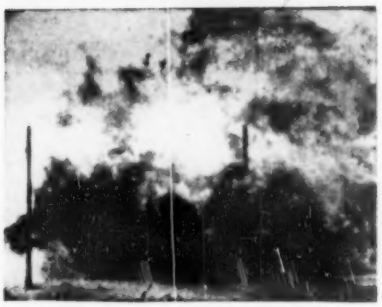
With such tests on bombs, tanks, canopies and ejection seats out of the way, may we suggest that the CAL engineers figure a way to model a missile launching from the ground or an airplane. The industry would be satisfied with either, I'm sure.

* * *

Did you notice the types of airplanes in which Molotov and company flew to the recent Geneva conference? In Russia they are known as Li-2 transports; to you and me, they're known as Douglas C-47 transports. Whatever happened to the Ilyushin 12 airliner? They were good enough to sell to the Czechs for their airline; aren't they good enough to transport the high government officials?–DAA

Operation Pushover





Deliberate destruction of a fully fueled V-2 rocket was the object of Operation Pushover, a preliminary test before Operation Sandy, Navy's at sea firing of the big missile from the deck of the heavy carrier USS Midway. Test was to assess possible damage to wooden carrier deck and nearby structure in event of accident in launching. Sandy, the launching from the Midway, was partially successful; the missile cleared the deck on takeoff, but broke up at low altitude away from the ship. Pushover and Sandy were cooperative projects of Navy, Army Ordnance and General Electric's Project Hermes, completed during 1949; these pictures have just been released.

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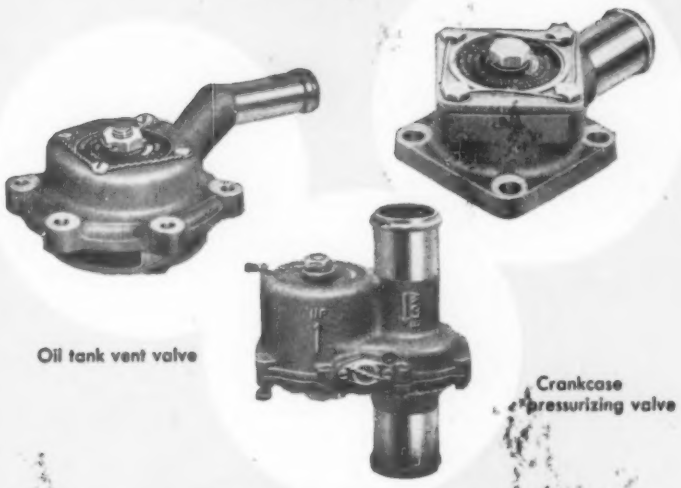
Barometric

VENT VALVES

Oil tank vent valve



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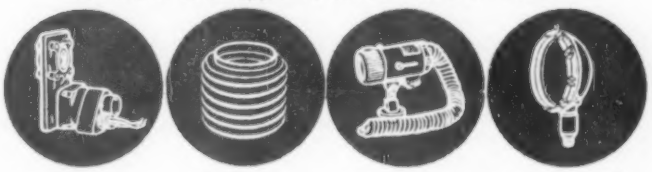
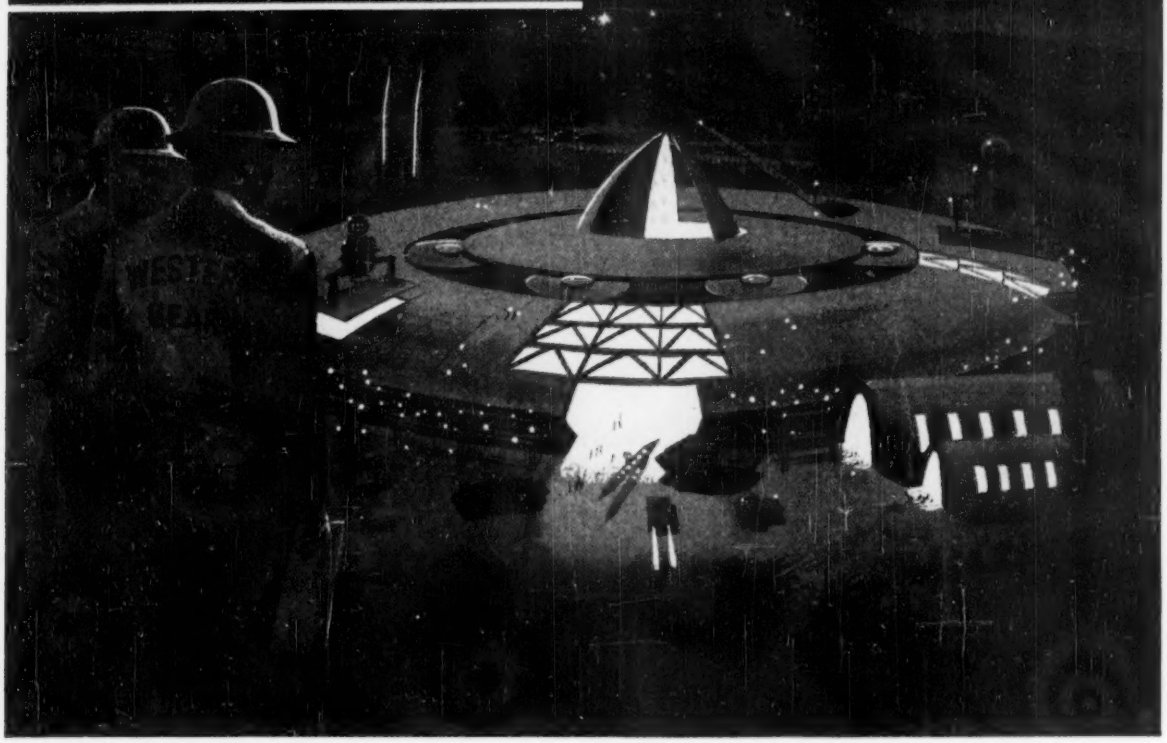


Shut-off Valves | Tech-Forge Flexible Couplings | Cockpit Lamp Assembly | Vaporproof Cabin Lamp

GEAR DRIVES for SPACE STATION



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PRODUCTION BRIEFING

▶**Klein Institute** for Aptitude Testing, Inc., Graybar Bldg., New York 17, lists among its 1953 clients the following firms engaged in aviation work: Bendix Aviation Pacific Division, sales aptitude and supervisory or executive testing; Hiller Engineering Corp., supervisory or executive testing; The DoAll Co., sales aptitude testing; Walter Kidde & Co., sales aptitude testing; Airborne Instruments Lab., supervisory or executive testing; Ford Instrument Corp., division of Sperry Corp., sales aptitude testing.

▶**Aceto Chemical Co., Inc.,** Flushing, N. Y., has established a new industrial waste recovery and salvage service based on uses it has found for waste from solvent degreasing units, electroplating bath sludges, plastic and rubber scrap and waste products, abrasive dusts, waste transformer oils, etc.

▶**C. P. Clare & Co.,** manufacturer of multiple contact relays, has moved to a new plant at 3101 W. Pratt Blvd., Chicago 45, Ill.

▶**Tempil Corp.,** has moved all office and shipping facilities to 132 W. 22d St., New York, where the company's plant and laboratory are located.

▶**Western Aviation, Inc.,** has been organized and appointed Beechcraft dealers for the J. R. Gray Co., Inc., in the Ft. Worth-Wichita Falls-West Texas area. Main offices for the new firm are in the Sinclair Building, Ft. Worth and the City National Bank Building, Wichita Falls.

▶**Edward Blake Co.,** West Newton, Mass., is making available a new precision tap sharpening service. West Coast customers are served through the firm's representatives in San Diego, Calif.

▶**Boeing Airplane Co.** has placed into service an automatic highspeed communications system linking all key offices, plants and engineering operations. The setup, installed by Western Union, permits any station on the network to originate a message to any other station without preliminary calling or connecting. Messages are recorded at the destination in exact form of transmission. The company also plans to put up two buildings costing more than $2.3 million at Seattle, Wash. One will be a material handling building having 285,000 sq. ft. of floor space, the other will be a 40x120-ft. addition to its powerplant test center.

IS THE DATA VALID?

The moment an oscillograph is taken out of the laboratory for aircraft flight testing, vehicle road tests, or any application where vibration and dynamic g forces are present, the "balance" of its galvanometers—the measure of their response to gravitational force—becomes all-important. An unbalanced galvanometer can cause deflections—under only moderate g-loadings—large enough to distort a data trace and make accurate record interpretation impossible. It can show deflections even when no data signal is present.

Miller Instruments' *improved* galvanometers are supplied *at no extra cost* with balance so closely controlled that trace deflection is within 0.010" per g in elements of less than 300 cps natural frequency and within 0.001" per g for higher frequencies. The unique open construction allows balancing to be the *final* operation before shipment. No subsequent assembly steps disturb the balance achieved. Trace deflection due to g forces displacing the suspension is negligible.

Sound basic concept and extreme care in manufacturing and testing make Miller Galvanometers unequalled not only in their balance but also in their control of sensitivity, linearity and stability. Inaccuracies have been literally "designed out." The unusual fineness of the traces they produce have long been the standard in oscillographic recording. Available with natural frequencies from 35 to 3200 cps and a wide range of sensitivities, Miller Galvanometers are described in detailed literature, which will be sent on request.

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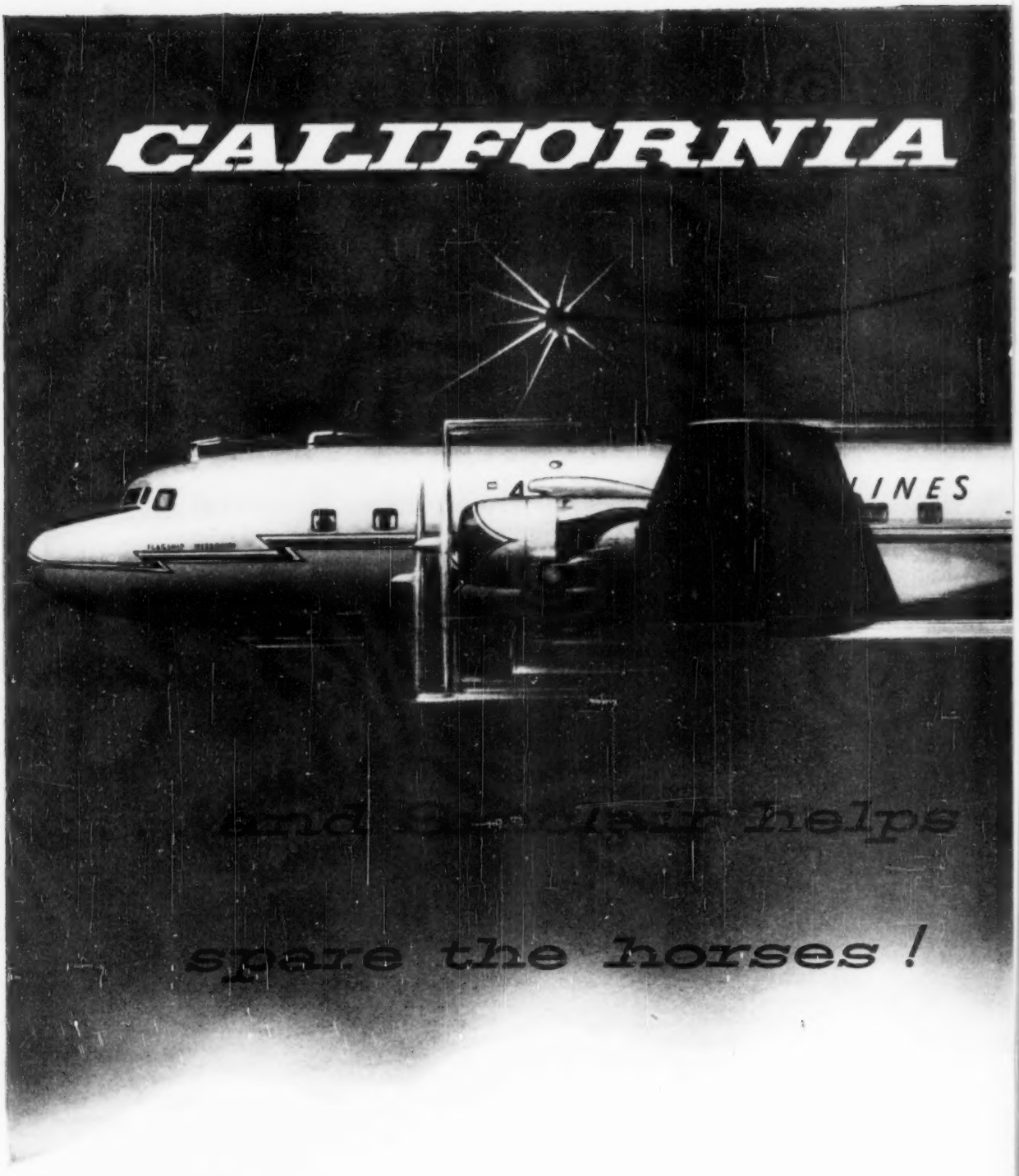
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American

It takes 13,000 horses to speed American Airlines' DC-7s on their nonstop hops across the continent. That's a lot of power to pull one plane – but, then, 365 miles-per-hour is a lot of speed for a commercial airliner. This speed plus the luxury of the DC-7 accounts for the fact that American has had to *triple* its new service in less than six months time.

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FINANCIAL AID TO HIGHER EDUCATION

What Business Can Do to Help Our Colleges and Universities

Is the financial squeeze now gripping our colleges and universities grave enough to warrant direct action by the business community? If so, what can business do about it? This editorial is addressed to these two questions.

In the previous editorial in this series of two, it was demonstrated that **our colleges and universities, and particularly the independent institutions, face financial difficulties, which, unless relieved, promise to get progressively worse and might ultimately result in a national disaster.** This state of affairs obviously gives the business community a crucial stake in helping to relieve the plight of these institutions. For our business organizations can be no stronger than the total community of which they are a part.

It does not follow automatically, however, that every business firm should give direct financial aid to education. Already the business structure is heavily burdened with activities unrelated to its main purpose. These include acting as tax collector for more than $65 billion of federal, state and local taxes in the year 1953. There is a limit to the amount of such public enterprise that can be loaded on the business system.

Business Holds Key to Answer

If, however, the survival of a key part of our educational system depends on its having financial help from the business community, that help should be provided. And this is the situation of our independent privately endowed colleges and universities.

Of course, our tax-supported institutions of higher learning must also be kept strong, financially and otherwise. But they have recourse to public support not available to the independent institutions. Largely on this account, their present financial difficulties are much less acute than those of the independent colleges and universities.

These independent institutions have seen price inflation eat away much of the value of their endowments. Moreover, there is no prospect that these endowments can be sufficiently replenished by gifts from the wealthy people who provided them in earlier years. Progressive income and estate taxes have seen to that. Thus, they are faced not only with a peculiarly acute financial problem, but also one which cannot be solved except by tapping other sources of aid.

Tax Support No Solution

It is conceivable that the independent colleges and universities might solve their financial problem by seeking support from tax revenues. If they did this, however, they would lose their distinctive character as independent institutions, and our system of higher education would lose one of its major elements of strength. That is the existence in our educational system of both independently financed and tax-supported colleges and universities. Each has its special contribution to make to a well-balanced system of higher education.

Business is directly dependent upon higher education to staff its increasingly complex and exacting operations. A key part in this process is played by the small, independent liberal arts colleges which are the hardest hit financially of all our institutions of higher learning. "These," states the Council for Financial Aid to Education, recently formed by a group of business leaders, "have contributed a high proportion of the intellectual, scientific and religious, as well as business leadership of the nation. Their programs are devoted to the teaching of values, particularly the values of freedom. They are a vital bulwark to our system of free enterprise."

Means of Providing Help

There are many means by which business firms can extend help to our colleges and universities. The most obvious, of course, is to make outright grants of money either to individual institutions or to groups of institutions for such uses as the institutions think best. Another means of help, increasingly employed by business firms, is to establish scholarships to pay the full cost of college or university courses of study. Sometimes the scholarships are open for general competition, sometimes they are limited to employees and children of employees of the firm granting them. Not infrequently those winning the scholarships spend some part of their school vacations working in the companies granting the scholarships.

A number of companies have recently provided for what have come to be called "scholarships in reverse." These companies pay a flat sum to a college or university for every one of its graduates they employ. Financing of university research programs also offers a broad avenue for financial aid to our universities by business.

Need Two-Way Communication

Some business firms have well-developed programs for financial aid to education. But they are exceptional. For most companies the problems involved are new and strange. These companies were created with the basic purpose to make money, not to give it away. Successful philanthopic operations involve a whole set of problems with which they have very little experience. Not the least of these is how to make business a dependable source of financial aid to education, since business has no assurance that the profits of one year will not be losses the next.

Considerations such as these emphasize the wisdom of a recent Industry-College Conference on aid to higher education by business, in making the first of its ten conclusions that "better communication, by direct contact, is needed for each [industry and the colleges] to understand the problems of the other." At this juncture the creation of mutual understanding is much more important than the raising of some money and letting it go at that. The problem of aid to education by business has its immediate urgency, but there is also a long-range program to be developed on which business and the colleges and universities must pull together in the years ahead to find a satisfactory solution.

As stated at the outset, failure to find a satisfactory solution could result in a national disaster. This means that, **to give proper heed to their own future prosperity and the future welfare of the nation, business firms generally must go to work on the problem of financial aid to higher education. They must go to work first, to understand the problem; second, to establish two-way communication with our colleges and universities about it; and third, to develop a program which pays proper heed to the needs and capabilities of both business and higher education.**

This message is one of a series prepared by the McGraw-Hill Department of Economics to help increase public knowledge and understanding of important nationwide developments that are of particular concern to the business and professional community served by our industrial and technical publications.

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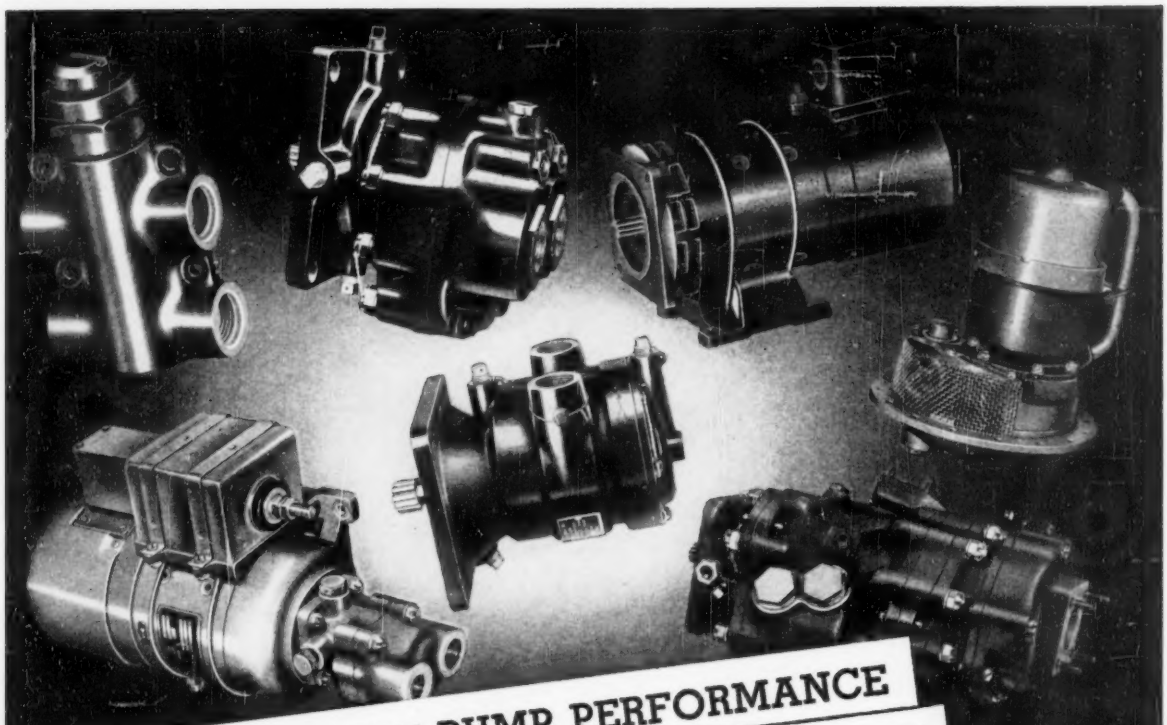

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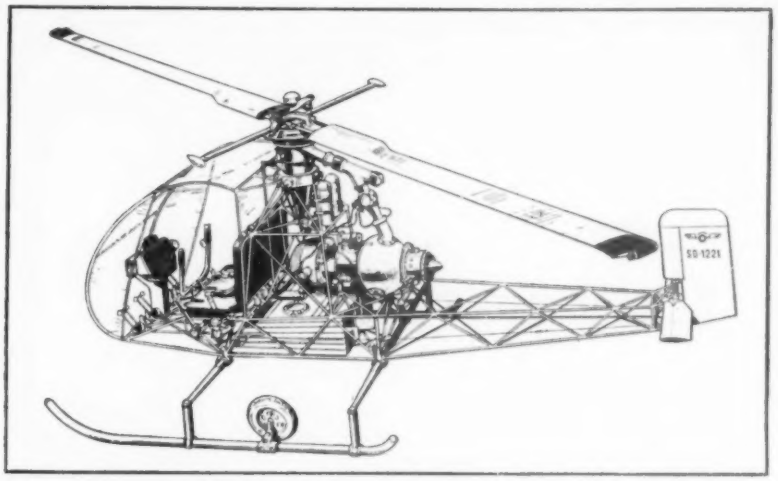


S.O. 1221's unusual turbine powerplant system is shown in this schematic of the copter.

Sncaso Testing Production Djinn

The production version of the S. O. 1221 Djinn, a lightweight jet-powered helicopter capable of carrying nearly its own weight in useful load, is being tested by the French nationalized aircraft firm Sncaso, Paris. This caps a development program extending back to 1946.

According to Paul Morcain, Sncaso's chief of helicopter development, the Djinn's powerplant system can serve as the basis for larger copters seating 20 or 40 passengers.

▶**Power System**—Heart of the Djinn two-placer is the turbine-rotor combination using as a power source a Turbomeca Palouste air generator. The Palouste is a simple unit; in essence, the power normally delivered to a shaft is entirely used by the compressor. The compressor has been over-dimensioned so that the excess of air it produces can be used in the rotor.

Outstanding difference between the Djinn and the earlier Ariel series of jet copters tested by Sncaso is that the latter had blade-tip combustion chambers where fuel was injected and ignited, whereas the Djinn relies solely upon the compressed air generated by the fuselage-mounted Palouste unit to spin its main two-blade rotor.

Morcain admits that the former system provided more power from a smaller parent engine. But advantages the present design gains in simplification, noise reduction and reduction of fuel consumption greatly outweigh those of the previous method.

▶**Rotor Mounting**—The rotor's hub is a free-oscillating type. The hub and blades form a unit which tilts according to cyclic pitch commands transmitted from cockpit controls. Morcain points out that in this method relative movement of the blades in vertical flapping is reduced to a minimum and there is no need for free movement of the blades in the plane of the rotor. The method also eliminates drag-dampers, which he notes are difficult to regulate.

Cyclic pitch control, like the collective pitch control, is of the spider-type, with a rod going through the central bearing. Concentrically around this bearing, two spherical elements revolving with the mobile portion of the hub, mark off a space through which the compressed air from the Palouste passes into the rotors. The air reaches the blades through a glass-cloth hose, sheathed with silicone rubber, which absorbs the relative movements of the blade in relation to the hub.

Blades are attached to the hub by tensile steel straps directly linking one blade-root to the opposite one. In this way centrifugal forces are directly balanced and supported entirely by the metal straps, their flexibility allowing for pitch variations and vertical flapping. This method eliminates all bearings and stops normally used to hold the blades and reduces maintenance.

▶**Blade Makeup**—Blades are all-metal, with a hollow spar forming the leading edge. The Cegedur company extrudes this spar with a variable thickness. Following extrusion, the thickened section of the blade near the hub is died into a circular section to permit machining of two cylindrical bearing surfaces and an anchor tenon to which is fastened the iron fittings for the tensile steel straps.

The trailing edges are made up of light panels made rigid by using a cellular material bonded to the main spar by an outrigger secured to the spar by two piano wires sliding in slots of the outrigger and spar. The panels are fixed to the hub by a fastening device which takes the centrifugal loads.

The blade is connected to the hub by a pipe which serves as a duct for the compressed air and also has a terminal element fitted to it that ensures pitch positioning of the blade in the anchor. The jet nozzles at the blade tips are flush mounted.

Hub rotating seals are lubricated by circulating oil. A rubber bellows makes the hub airtight and protects it from dust, while allowing it to tilt.

▶**Performance**—The new Djinn weighs 675 to 760 lb. empty, depending upon equipment (which may include a windshield supplement or enclosed cabin, electric self-starter instead of crank starter, skid-mounted wheels and other items).

Normal gross weight is 1,390 lb. At this weight, the company states the S. O. 1221 can take off vertically from airfields at elevations up to 6,000 ft. Optimum cruise speed is 62 mph. with mean fuel consumption being 220 lb./hr. The craft's normal tankage is 66 gal. Highest efficiency is gotten from truck gasoline or kerosene.

With an average pilot and without fuel or payload the Djinn weighs 905 lb.

▶**Djinn Genesis**—Immediately following the liberation of France after World War II, some Sncaso engineers patented principles of a copter using compressed air fed to combustion chambers at the rotor tips. They later learned that an Austrian engineer, Doblhoff, had already developed this principle and flown an experimental type.

The Doblhoff team was disbanded, some of the engineers going to work with Fairey Aviation Co. in Britain where they worked on development of the jet-powered Gyrodyne (AVIATION WEEK Apr. 19, p.9). Doblhoff went to U. S. where he has worked on McDonnell's Little Henry ramjet copter and is now engaged on the XV-1 convertiplane. Other engineers from the group joined Snasco and aided in its jet copter projects.

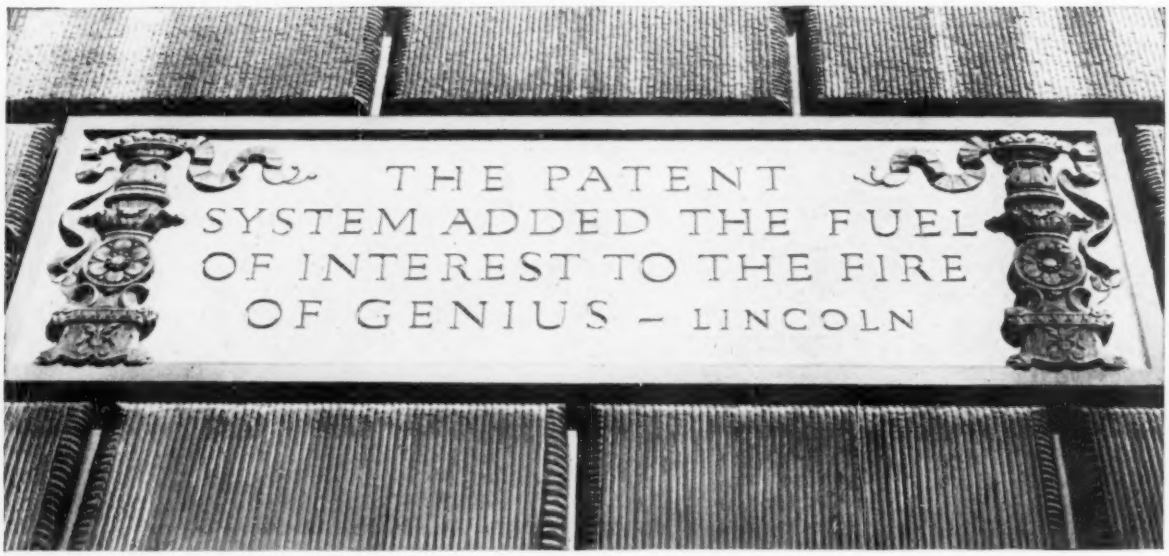
▶**Prototypes**—The group that came to Snasco developed jet copters along the following configurations:

• **Ariel 1**, which first flew in April 1946, powered by a piston engine which fed compressed air to combustion chambers at the tips of the three-blade rotor. This model lacked power.

• **Ariel 2**, modification of the Ariel 1, was fitted with a new engine driving a new compressor adapted by Turbomeca. But cooling a piston engine when the aircraft was stationary proved difficult.

• **Ariel 3** was the next step. It had a Turbomeca Arrius 1-type turbine driving a centrifugal compressor on the

DO YOU BELIEVE IN THIS?



INSCRIPTION, U. S. DEPARTMENT OF COMMERCE, WASHINGTON, D.C.

Few men have left this Nation a greater legacy than Abraham Lincoln. For his was the genius of seeing truth where it was hard to see.

He knew, for instance, that men work best when given an incentive. And that, like other men, the scientists and inventors who shape our future must have an incentive. He summed up this vital truth in the few simple words which you see above.

Like all great concepts, the American Patent System is jeopardized from time to time by transitory abuses. But we are confident it will survive... and spur us on to new achievements.

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same transmission shaft, and in the same gear case. Ariel 3 first flew in April 1951. However, this model proved to be very noisy, Morcain notes, and the company went on to eliminate the rotor-tip combustion chambers. Big drawback to this plan was that it entailed a 50% reduction in power available for the rotor, making it necessary to double the powerplant in the fuselage to maintain the same performance. About this time Turbomeca brought out its 240-hp. turbocompressor Palouste.

• **Djinn S. O. 1220** incorporated the new Palouste and a system of deviating turbine exhaust flow by means of a rudder to give directional control even while hovering. Power collected by the rudder is about half that which would be obtained using the same turbine and blade-tip combustion chambers. But since with rotors of the Ariel-type about as much fuel is consumed in the combustion chambers as in the turbine, fuel consumption ratio is about the same.

The elimination of blade-tip combustion chambers and fuel and ignition systems and price of this power is far from further advantage. Power in the fuselage must be doubled, but the weight and price of this power is far from being doubled, Morcain states.

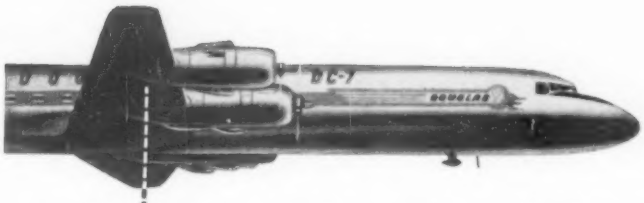
Initial flight of the first Djinn was made Jan. 2, 1953. Two S. O. 1220 prototypes made numerous demonstrations before civilian and military groups. The results of these tests were so satisfactory that Snasco went onto its current model the S. O. 1221.

AF Tests 'Ice Boxes' To Keep Food Warm

Dayton—Air Force engineers at Air Materiel Command are working on "ice boxes" with a reverse twist. Supply officers here at Wright-Patterson AFB are looking for a big "thermos jug" in which fresh meats, eggs, vegetables and other food can be parachuted to isolated radar and observation posts inside the frigid Arctic circle.

There is no problem in keeping things cold at these posts, where the temperature goes down around 60 degrees below zero. The problem is to keep air-dropped supplies from freezing solid by the time they hit the ground.

Col. R. L. Mason, packaging specialist at AMC, recently took a team of civilian suppliers on an Arctic air tour to look at the problem firsthand. Four days later, one of them furnished AMC with a fibrous glass "ice box." It is now being tried out in the Arctic. If successful, it will be mass-produced for fresh food delivery to Army, Navy and USAF outposts.



on the wing tank studs of the DC-7

-assure precision tensioning to the exact foot-pound

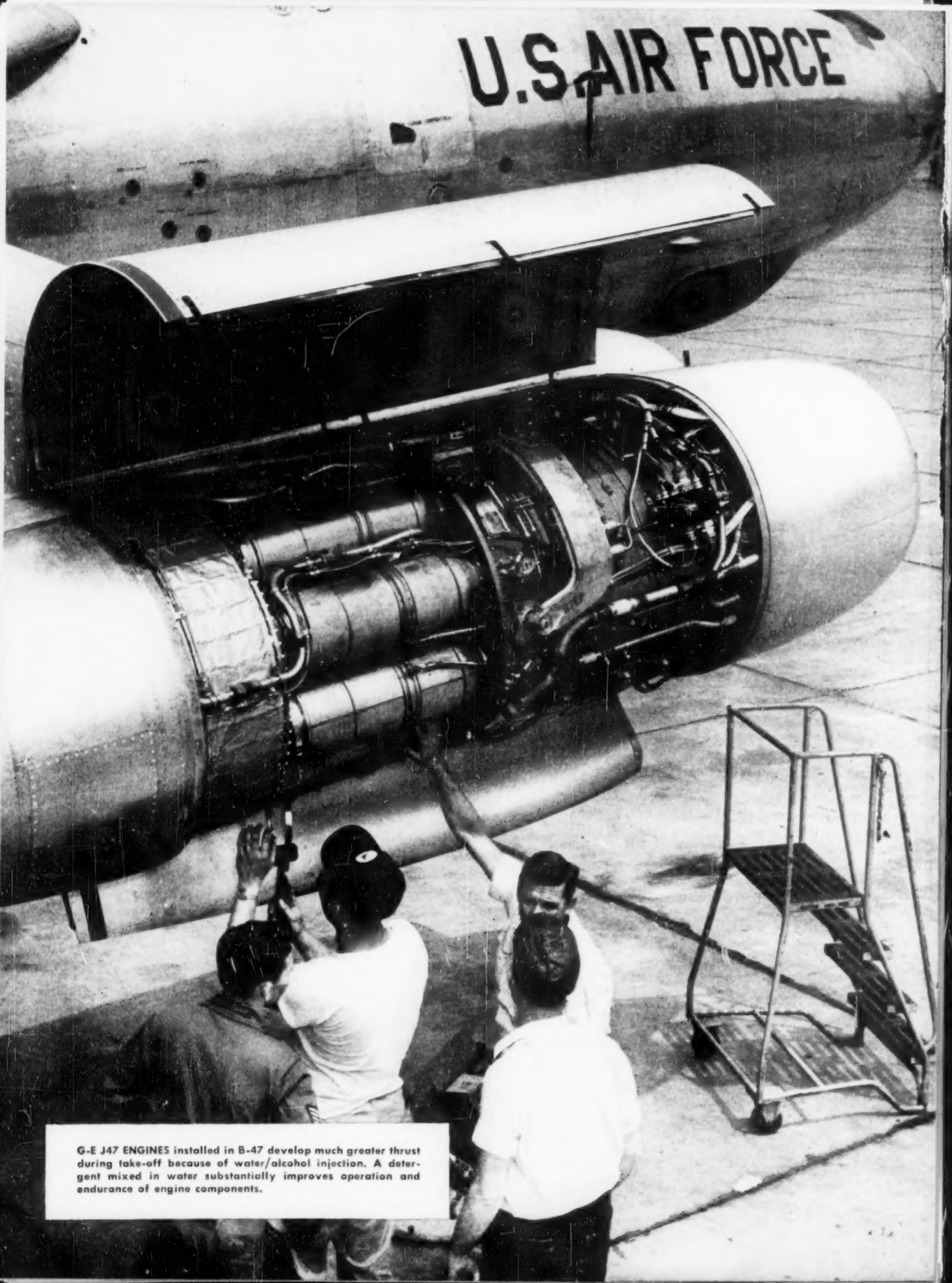
It's America's fastest, most luxurious airliner—the new Douglas DC-7! On many critical assembly operations in the construction of this great airliner, precision bolt tensioning is assured through the use of Snap-on Torqometers. Torqometers offer exclusive advantages that have won them wide preference throughout the aviation industry. For hairline accuracy, readings on the big dial are amplified nearly 500 times. Readings are *always* dependable. Torqometer design eliminates friction drag. Accuracy is never affected by the way the wrench is held.

Snap-on Torqometers are built in 24 standard models, capacity from 0 to 30 inch-pounds, up to 4,000 foot-pounds. Metric calibrated models also available. Direct service from Snap-on branch warehouses in principal aviation centers. Write for Snap-on industrial catalog and general catalog of 4000 Snap-on hand and bench tools.

SNAP-ON TOOLS CORPORATION

8020-F 28th Avenue, Kenosha, Wisconsin

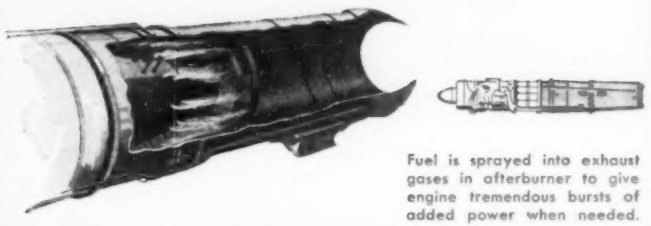
*Snap-on is the trademark of Snap-on Tools Corporation.



G-E J47 ENGINES installed in B-47 develop much greater thrust during take-off because of water/alcohol injection. A detergent mixed in water substantially improves operation and endurance of engine components.

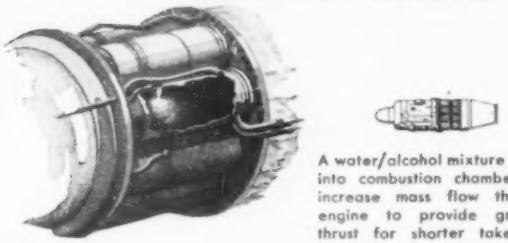
TWO METHODS USED TO AUGMENT THRUST IN JET ENGINES

AFTERBURNER OPERATION



Fuel is sprayed into exhaust gases in afterburner to give engine tremendous bursts of added power when needed.

WATER/ALCOHOL INJECTION



A water/alcohol mixture is fed into combustion chambers to increase mass flow through engine to provide greater thrust for shorter take-offs.

SOUPED-UP JET ENGINES... have they reached maximum power?

Not according to G-E engineers, who are working on simpler ways to achieve better, more efficient thrust augmentation

Your G.E.-powered aircraft can take off from shorter runways and climb higher, faster . . . all because of improved thrust augmentation methods developed at General Electric over the past 12 years.

Yet jet thrust augmentation—as a precise science—is still in its infancy. That's why General Electric engineers *continue* their search for ways to get simpler, more effective power when needed.

Excellent progress has been made at G.E. since 1948. Company engineers perfected an afterburner for use on the North American Aviation F-86D Sabre Jet. A G-E water/alcohol injection system has been developed to provide added take-off thrust for Boeing B-47 Stratojets.

New G-E augmentation systems (now under security restrictions) are available to the U.S. Air Force and Navy. By continuing to compile, analyze, and apply engine combustion data, G-E engineers are rapidly developing even newer methods.

Our jet representatives will be glad to discuss with you what General Electric is now doing in the thrust augmentation field. Contact your nearest G-E Apparatus Sales Office. *Section 230-24, General Electric Company, Schenectady 5, N. Y.*

Progress is our most important product

GENERAL ELECTRIC

IMPROVED COMPONENTS raise engine performance. Typical are new G-E thermocouples—X-rayed to insure against weak spots that could cause short circuits.

RESEARCH. This special "shock wave tube" helps G-E engineers solve jet combustion problems. Shock waves traveling faster than sound can be photographed and studied in detail.

THE PAY-OFF to your Air Force comes in G.E.-powered planes like this afterburner-equipped F-86D. Efficient, powerful G-E turbojets help U.S. remain strong in the air.

Navy Contracts

Contracts recently announced by the Navy's Aviation Supply Office, 700 Robbins Ave., Philadelphia 11, are:

American Marine Paint Co., 311 California St., San Francisco 4, Calif., anti-fouling, anti-corrosive paint, $16,248.

Bendix Products Div., Bendix Aviation Corp., 401 Bendix Drive, South Bend 20, Ind., items of fuel control parts AF MIPR R5-83N (Item 10) Amendment S-27, $73,617; engine parts for P&W engines, $767,490; maintenance parts used on strut assy., $113,791; maintenance parts used on nose strut assy., $630,071; carburetor for 2800-52W engine, 60 ea., $76,301; spare parts for P&W engines, $36,029.

Blocksom & Co., 5th and Canal Sts., Michigan City, Ind., cushioning material, $26,114.

Breeze Corp., Inc., 41 South 6th St., Newark 7, N. J., maintenance parts for use on R861I-3520 harness, $28,022.

Cleveland Pneumatic Tool Co., 3781 E. 77th St., Cleveland 5, Ohio, actuator, 150 ea., $252,758.

Eclipse-Pioneer Div., Bendix Aviation Corp., Teterboro, N. J., force links, 258 ea., $36,324; various instruments for various aircraft, $35,734; indicators, $47,215.

Glidden Co., 11001 Madison Ave., Cleveland 2, Ohio, enamel, 42,784 gal., $97,558.

Hewlett-Package Co., 395 Page Mill Rd., Palo Alto, Calif., signal generator, 22 ea., $45,851.

Pesco-Products Div., Borg-Warner Corp., 24700 N. Miles Rd., Bedford, Ohio, pumps for various aircraft, $183,110.

Turco Products Co., 95 Fairmount Ave., Philadelphia, Pa., compound, cleaning, 11,250 gal., $28,237.

Hamilton Standard Div., United Aircraft Corp., Windsor Locks, Conn., kit of items for HSD propellers, 898 ea., $29,625.

Vapor Heating Corp., 80 E. Jackson Blvd., Chicago 4, Ill., spare parts for FJ-2 aircraft, 184 ea., $80,003.

Weston Electrical Instrument Corp., c/o Joralemon, Craig & Co., 101 N. 33rd St., Philadelphia 4, Pa., indicator, turbine outlet & temperature, 908 ea., $38,123.

Wm. R. Whittaker Co. Ltd., 915 N. Citrus Ave., Los Angeles 38, Calif., valve assys., $189,576.

A. C. Spark Plug Div., General Motors Corp., Flint 2, Mich., spark plugs, 60,600 ea., $212,100.

Aeronautical Machinery Corp., Inc., c/o Nestor Johnson Mfg. Co., 1900 N. Springfield Ave., Chicago 47, Ill., jack, tail, universal, 82 ea., $63,785.

Air Associates, Inc., 216 Union St., Hackensack, N. J., pulley used on various aircraft, 53,447 ea., $49,706.

Aircooled Motors Inc., Liverpool Rd., Syracuse, N. Y., maintenance parts for support of 0-425-1 engine, $107,165.

AiResearch Mfg. Co., 9851-9951 Sepulveda Blvd., Los Angeles 45, Calif., maintenance parts used on refrigeration unit and turbine assy., $66,805; retrofit kit, 306 ea., $51,898.

Champion Spark Plug Co., Toledo, igniter for P&W J57-P7 engines, 6,500 ea., $60,853.

Cleveland Pneumatic Tool Co., 3781 E. 77th St., Cleveland 5, strut assy., 10 ea., $52,012.

Eclipse-Pioneer Div., Bendix Aviation Corp., Teterboro, N. J., bearing, 23,300 ea., $31,688.

Glidden Co., 11001 Madison Ave., Cleveland 2, aircraft enamel, $37,463.

Guardian Electric Mfg. Co., 1621 W. Walnut St., Chicago 12, grip control, 730 ea., $37,522.

Joy Manufacturing Co., 140 Cedar St., New York 6, blower, $25,896.

Lear, Inc., 110 Ionia Ave., N. W., Grand Rapids 2, Mich., actuators and controllers for various aircraft, $80,423.

Liquidometer Corp., 41-03 36th St., Long Island City, N. Y., transmitters, 600 ea. **$59,196.**

Loral Electronics Corp., 794 E. 140th St. New York, crystal calibrator and spare parts, 100 ea., $29,525.

McDonnell Aircraft Corp., P. O. Box 516 St. Louis 3, various assys. and maintenance parts for F2H aircraft, $39,641; maintenance parts for F2H spares, $264,601.

Mar Vista Engineering Co., 5420 W. 104th St., Los Angeles, hydraulic valve and spare parts, 137 ea., $33,183.

Marshall Rubber Co., 4622 E. Grand Ave., Dallas 23, balloon, 17,650 ea., $54,186.

Glenn L. Martin Co., Baltimore 3, 91 items of maintenance spares for P4M aircraft, $76,599.

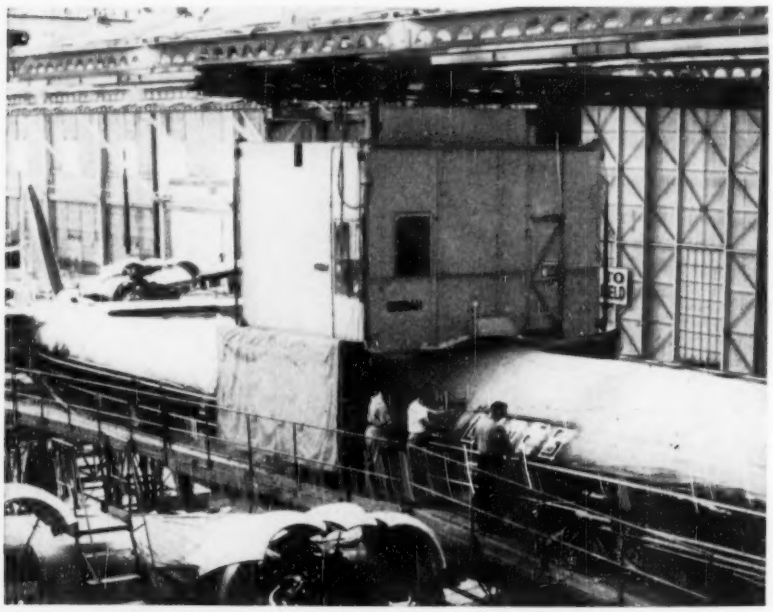
Radio City Products Co., Inc., Centre and Glendale Sts., Easton, Pa., gyroscope test set, 41 ea., $138,744.

Hamilton Standard Div., United Aircraft Corp., Windsor Locks, Conn., test machine and adapter, $26,934.

Pratt & Whitney Aircraft Div., United Aircraft Corp., East Hartford 8, Conn., material for use on P&W engines, $58,222.

Vectron, Inc., 400 Main St., Waltham 45, Mass., indicators; drawings and handbooks for same, $46,276.

Weston Hydraulics Ltd., 10918 Burbank Blvd., N. Hollywood, Calif., hydraulic valve assy., 114 ea., $49,509.



'Elephant Saddle' Cuts Paint Time

A trick borrowed from elephant riders enables Lockheed Aircraft Corp. to speed painting of its large Constellation transports, saving five days per plane, the company says. This novel spray booth, shown suspended over a Super Connie carries the painters back and forth over the plane while other work is proceeding. The convеyorized paint booth measures 20 ft. high by 13 ft. wide and 13 ft. long, has special air conditioning and fire fighting equipment. An exhaust system sucks up all paint residue and fumes through a filtered vent in the booth's roof. Lockheed has licensed the Amercon Corp., Los Angeles, to build and sell the paint "howdah."

BuAer Contracts

The following contract awards of $25,000 and more have been announced recently by the Bureau of Aeronautics, Department of the Navy, Washington 25, D. C.

E. W. BLISS CO., Canton, Ohio, catapult type C, mark 11, mod. 1 and associated maintenance spares and special tools, 4 ea., $2,640,776.

DOUGLAS AIRCRAFT CO., INC., Santa Monica, Calif., airborne pallet suitable for loading, air transporting, and unloading the MK-6 special weapon in model R6D and R7V aircraft, $50,901.

FAIRCHILD CAMERA AND INSTRUMENT CORP., Syosset, L. I., N. Y., low-altitude, day and night reconnaissance camera, 70-mm., type X-CAX-3, 1 ea., $97,522.

FOURNIER INSTITUTE OF TECHNOLOGY, Lemont, Ill., secondary silver-zinc aircraft batteries, 10 ea., $76,400.

GENERAL ELECTRIC CO., Syracuse, N. Y., services and matl. to conduct (2) courses of instruction each (4) weeks long, to train approx. (16) Naval personnel and (14) Air Force personnel in the installation, operation and maintenance of AN/APA-56 equip., $36,567.

KAMAN AIRCRAFT CORP., Bloomfield, Conn., conduct an engineering study on the dynamic response of helicopter rotor systems, considering the effects of blade flexibility, blade coupling and shaft pitching, under the action of arbitrary externally applied loads, and prepare and furnish (23) copies of report thereon. $39,541.

SPECIALTIES, INC., Syosset, L. I., N. Y., compensators, angle of attack and sideslip, 460 ea., $540,163.

WOLF MANAGEMENT ENGINEERING CO., Chicago, conduct a study and furnish consulting services on present cost accounting and control systems in the overhaul and repair depts., and establish a standard integrated system of cost control which will enable management to effectively control costs of operation and evaluate performance; furnish follow-up services in connection with the system and prepare reports, etc., $54,426.

BARTH ENGINEERING & MFG. CO., Milldale, Conn., design, develop, construct and furnish (1) experimental model of a lightweight radiosonde receptor; progress and final reports, $63,995.

GENERAL ELECTRIC CORP., Schenectady, N. Y., AN/APS-20B test bench harnesses; spare parts; design data; bill of matl.; dwgs.; catalog data; publs.; 150 ea., $978,399.

Photo courtesy of Trans World Airlines, Inc.

SANITARY SERVICE FACILITIES FREE FROM EXCESS WEIGHT

Galleys featuring ENDURO Stainless Steel equipment wear the look of competence and efficiency that's traditional in airline service.

ENDURO equipment stays bright, shining, and inviting because it's so superbly easy to clean and to keep clean. It resists rust and corrosion, can't chip or crack, never stains or tarnishes in galley service. Scrupulously sanitary conditions are easier for busy flight stewardesses to maintain.

And, you get these benefits without paying a weight penalty. ENDURO's strength-to-weight ratio is so high that you use it in thinner, lighter section. ENDURO is made for flight.

Long, long life . . . handsome appearance . . . ease of fabrication . . . ready availability . . . resistance to normal wear . . . are other bonus benefits ENDURO equipment offers you. Eventually, you'll want all its advantages. Now is the time to start planning. Republic will help you and your equipment suppliers apply ENDURO most efficiently and economically. Write:

REPUBLIC STEEL CORPORATION
Alloy Steel Division • Massillon, Ohio
GENERAL OFFICES • CLEVELAND 1, OHIO
Export Department: Chrysler Building, New York 17, N. Y.

REPUBLIC STEEL

REPUBLIC
ENDURO STAINLESS STEEL

Other Republic Products include Carbon and Alloy Steels — Titanium — Pipe, Sheets, Strip, Bars, Wire, Pig Iron, Bolts and Nuts, Tubing

I NEED THERMOCOUPLE AND EXTENSION WIRES ...AND THEY MUST MEET "MIL" SPECIFICATIONS.

THEN GET 'EM FROM T-E.

T-E makes all types of "MIL" spec wires. Take your pick from the list below. Most are in stock. If you don't see what you want, let us know. That's our business—making the wires you want.

MIL-W-5845A—Iron Constantan

type I Classes A, B, C, D, E, F, G, H, I, J Gages from 14 to 30
type II Classes A, B, C 8 ohms/100 ft.
type III Classes A, B, C 8 ohms/200 ft.

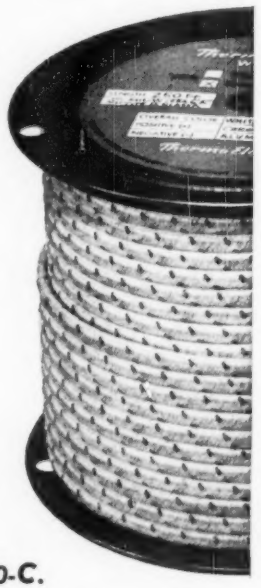
MIL-W-5846A—Chromel Alumel

type I Classes A, B, C, D, E, Gages from 14 to 26
type II Class A 7 ohms/25 ft.
type III Class A 7 ohms/50 ft.
type IV Class A 7 ohms/100 ft.

MIL-W-5908B—Copper Constantan

type I Classes A, B, C, D, E, F, G Gages from 12 to 20
type II Classes A and B 7 ohms/200 ft.
type III Classes A and B 20-18 gage
type IV Classes A and B 20-16 gage
type V Classes A and B 18-14 gage

Stainless steel overbraid on any "MIL" spec wire, if you wish.



Interested? Write for Bulletin 31-200-C.

Pyrometers • Thermocouples • Protection Tubes • Quick-Coupling Connectors
Thermocouple and Extension Wires • Resistance Bulbs • Connector Panels

Thermo Electric Co., Inc.
SADDLE RIVER TOWNSHIP, ROCHELLE PARK POST OFFICE, NEW JERSEY
IN CANADA—THERMO ELECTRIC (Canada) Ltd., BRAMPTON, ONTARIO

INDEPENDENT CONTRACTORS AND ENGINEERS, Dallas, Tex., provide materials, equip. and install (2) each turboprop. engine test equip. at Norfolk NAS and Alameda NAS, $943,616.

JERED INDUSTRIES, INC., Hazel Park, Mich., design, develop, construct and furnish prototype aircraft spotting dollies; dwgs., reports; $37,985.

WESTINGHOUSE ELECTRIC CORP., Washington, D. C., manufacture and furnish: J40 engine handling adapters, 3 ea., J40 engine lifting mechanisms, 3 ea., $74,643.

ECLIPSE PIONEER DIV., Bendix Aviation Corp., Teterboro, N. J., materials and services necessary for the rehabilitation, improvement and replacement of designated installation at the govt.-owned magnesium foundry, Teterboro, N. J., job, $82,500.

GRUMMAN AIRCRAFT ENGINEERING CORP., Bethpage, L. I., N. Y., kits of parts for installation of the AN/ARA-25 UHF direction finder in delivered Model SA-16A-GA aircraft; service instructions, 23 ea., $27,211.

LOCKHEED AIRCRAFT CORP., Burbank, Calif., air mobile trainers, maintenance including instructor training courses for Naval personnel and appropriate training aids, 2 ea., $268,643.

McKIERNAN-TERRY CO., Harrison, N. J., catapults, each with maint. spares and spec. tools: Type C, Mark 11, 2 ea.; Mod. 1, Type C, Mark 7, 2 ea.; sets of lifting equipment, 8 ea.; $2,806,738.

REACTION MOTORS, INC., Rockaway, N. J., design, develop, construct, test and install a variable-flow propellant injection system to accommodate the existing scale-model gasoline-air-water reaction chamber, reports, job, $5,125,361.

REEVES INSTRUMENT CORP., New York, N. Y., solve simulation problems as assigned by the Bureau of Aeronautics. Maintain cyclone lab., equipment, modify and improve existing equipt., and develop, construct and furnish such addl. equipt. as may be needed to efficiently solve assigned problems; maintain day-to-day log and prepare monthly, quarterly and post-solution analysis reports, job, $580,436.

SPERRY GYRO CO. DIV., Sperry Corp., Great Neck, L. I., N. Y., AN/UPM-44 radar test sets, spare parts, publ. dwgs., design data, bill of material, catalog data, 114 ea., $969,825.

TELEPHONICS CORP., Huntington, L. I., N. Y., universal engine air transport stand, 50 ea., J33 adapter kits, 25 ea., J48 adapter kits, 25 ea., R3350 adapter kits, publications, 25 ea., $219,440.

Gentile Depot Awards

The following contracts were recently announced by Gentile AF Depot, Dayton, Ohio:

• **AC Spark Plug Div., General Motors Corp.,** Flint 2, Mich., tester assembly, spark plug complete with adapters, AC spark plug, 107 ea., $59,492.

• **Cook Electric Co.,** 2700 N. Southport Ave., Chicago, switch, pressure, SPST, 496 ea., $26,536.

• **Hoffman Laboratories, Inc.,** 3761 South Hill St., Los Angeles, dipole and cable assy. for the AS-186/APA-17 antenna, 1,312 ea., $26,932.

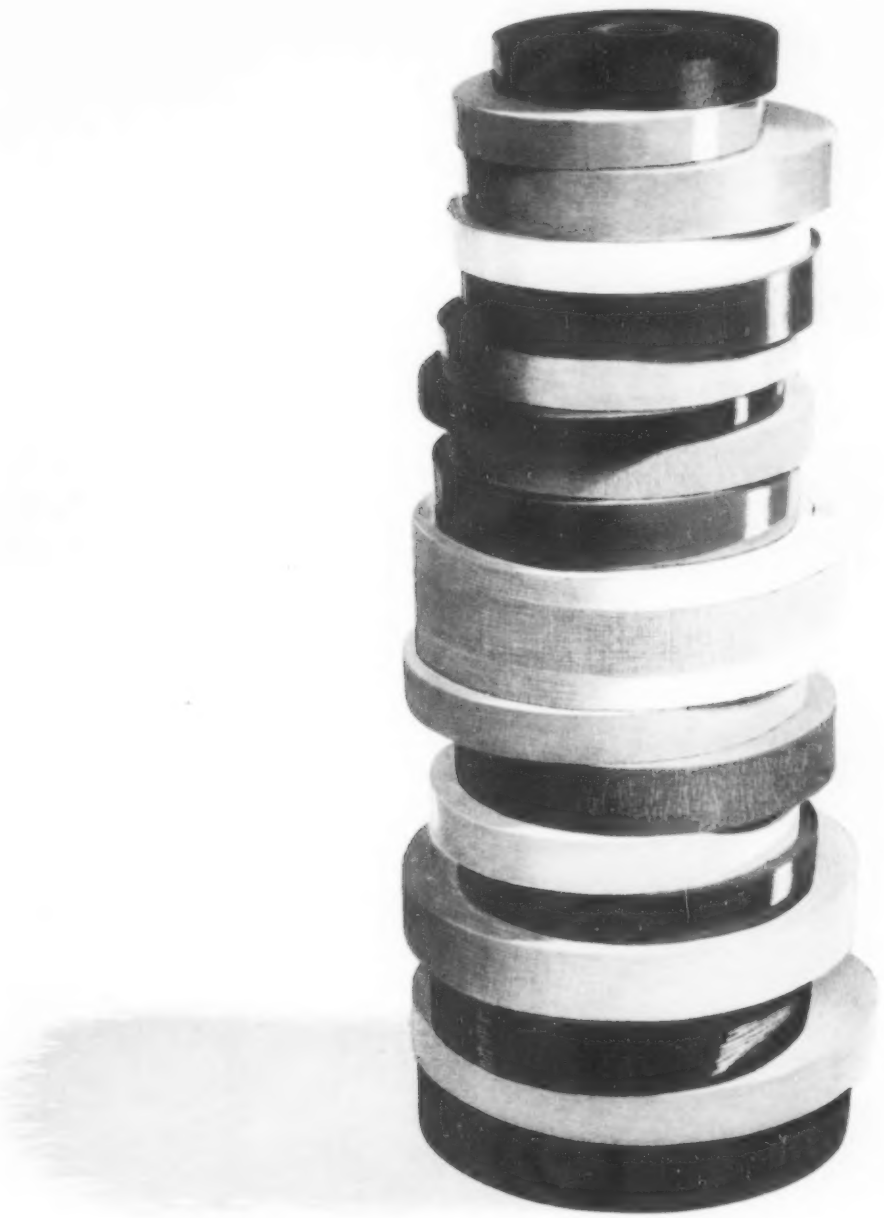
• **Meletron Corp.,** 950 North Highland Ave., Los Angeles 38, items 1 and 3, switch, pressure-actuated, 730 ea., $52,425.

• **Radio Corp. of America, RCA Victor Div.,** 19th and Federal St., Camden, N. J., relay, solenoid, nonpile-up type, 440 ea., $31,033.

• **Raytheon Manufacturing Co., Power Tube Div.,** Waltham 54, Mass., tube, electron, transmitting, magnetron, 750 ea., $300,000.

• **Sprague Engineering & Sales Corp.,** 1144 West 135th St., Gardena, Calif., stand assemblies, hydraulic oil pump test, 2 ea., stand assemblies, booster pump test, 7 ea., $115,793.

• **Sylvania Electric Products, Inc.,** 1740 Broadway, New York 19, tube electron, JAN type 5751 WA, receiving triode, general purpose, 9,000 ea., $26,820.



whatever the job . . .

SELF-STICKING

PERMACEL® TAPES

In our complete line, there's a self-sticking tape for every job — write Permacel Tape Corporation, New Brunswick, N. J.

ESNA's new lightweight product lines

Design specifications on these complete lightweight lines now available

All of these new self-locking nut product lines have been approved for use on Air Force, Army and Navy aircraft. Look them over—decide how much these weight reductions can mean to you.

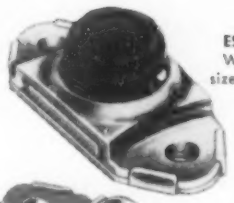
Save 115 lbs. per bomber—On a bomber the size of a B-52 ESNA Blue "J's" applied to steel bolts and used in place of AN steel self-locking nuts would eliminate 115 lbs. of fastener weight without sacrificing strength! Lubricated to minimize thread wear and galling. Hex nuts are offered with fiber or nylon locking inserts while anchor and channel types of "fixed" nuts are provided exclusively with nylon to permit extended reusability. *Completely interchangeable* with similar steel parts. Available in #6 through ¼" sizes . . . in every important hex and "fixed" nut configuration including floating basket nuts and straight and curved gang channel.

ESNA Type Y
Weight saving—¼—28 size = .36 lb/100 pieces.
40%* lighter!

For ¼" sizes and above — Here is the new ESNA "12-point" nut, a steel part that meets AN365 tensile requirements with significant weight savings in sizes of ¼" and above. Double hex shape permits design improvements and easier installation for locations where wrenching clearance is limited.

ESNA Type NA401
Weight saving—10/32 size = .51 lb/100 pieces.
51%* lighter!

ESNA Type NAJ401
Weight saving—10/32 size = .64 lb/100 pieces.
64%* lighter!



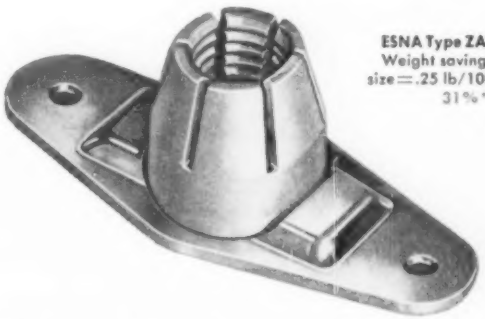
ESNA Type 12LHA401
Weight saving—10/32 size = .41 lb/100 pieces.
41%* lighter!

"Floaters" — When production methods result in the minor subassembly misalignments that make floating type nuts desirable, look to ESNA for lighter, stronger parts. Pictured are ESNA's newly designed steel floater and floaters from the aluminum Blue "J" and high temperature LH lines. Conforming to AN366 dimensions, better performance and lower weight have been accomplished without sacrificing tensile strength.

ESNA Type LHA1
Weight saving—10/32 size = .39 lb/100 pieces.
56%* lighter!

For temperatures to 550° F — ESNA's new LH lines are lighter high-temperature anchor nuts with a completely new locking device offering performance that meets Spec AN-N-10 and providing extended reusability. Approval has been issued for sizes #6, 8, 10 and ¼". Also available in one lug, corner, two lug floating basket and gang channel types.

ESNA Type ZA1W1200
Weight saving—10/32 size = .25 lb/100 pieces.
31%* lighter!



Easier welding of fixed fasteners — Here is a lighter stainless steel anchor nut to be used for temperatures up to 1200° F. Available with rivet holes or welding nibs. Unplated base plate for Type 321 stainless makes it particularly suitable for attachment by welding. A second nut, designed for temperatures up to 800° F. to meet AN362C requisites, is also available.

With these new parts, you can save weight on virtually all aircraft self-locking nut applications. Mail our coupon for design specifications.

Elastic Stop Nut Corporation of America

*These are typical weight savings compared with earlier ESNA designs for the same applications.

Dept. N63-625, Elastic Stop Nut Corporation of America
2330 Vauxhall Road, Union, N. J.

Please send me the following free fastening information:

☐ Product literature, samples of the following types:_____

☐ Please have an ESNA application engineer get in touch with me.

Name_____ Title_____

Firm_____

Street_____

City_____ Zone____ State_____

DEPENDABLE...

for hi-pressure
for hi-flow capacity
for hi-g resistance

General Controls

AV-9

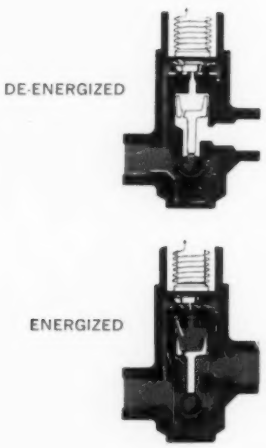
hi-g® *electro-magnetic*

shut-off valves

General Controls AV-9 hi-g® electro-magnetic shut-off valves provide high-pressure and high-flow capacity with distinct savings in size and weight. The pilot-valve construction minimizes current consumption and provides additional work force for controlling all liquids and gases, including hot air. Many variations of this versatile valve can be built to order. For high pressure control, high-flow capacity and reliable performance under high "G" conditions, General Controls' AV-9 is a *super* valve. Write for Catalog 53-A on your company letterhead.

GENERAL CONTROLS

Plants in: Glendale, Calif., Burbank, Calif., Skokie, Ill.
Factory Branches in 37 Principal Cities
SEE YOUR CLASSIFIED TELEPHONE DIRECTORY



Type shown is normally-closed when de-energized; normally-open types also available.

Manufacturers of Automatic Pressure, Temperature, Level and Flow Controls for Heating, Home Appliances, Refrigeration, Industrial and Aircraft Applications.

Panel Offers Ideas for Avionic Problems

Dayton forum suggests ideas for better reliability but finds no answer for growing complexity of devices.

By Philip Klass

Dayton, Ohio—A panel of 11 avionics experts believe reliability, not complexity, is the greatest problem in building practical, maintainable and tactically effective military electronic equipment for jet aircraft.

These representatives of the avionics industry, aircraft builders and military users—who participated in a forum during the recent Dayton conference on airborne electronics—offer more ideas on how to improve reliability than on how to limit complexity.

"What is considered complex today may be (considered) the essence of simplicity tomorrow," says panel moderator Dr. W.R.G. Baker, vice president of General Electric's Electronics Division. "Complexity, therefore, is relative to time, the familiarity of the user, and in inverse proportion to its reliability."

► **Performance Need**—Comments by other panel members on the inevitability of complexity:

• "Complexity results from the need for performance. . . . Some jobs we are trying to do are just on the ragged edge of possibility," according to Dr. C. S. Draper, Massachusetts Institute of Technology.

• "The amount of complexity is dictated by the tactical problem to be solved," says E. K. Foster, general manager of Bendix Radio.

• "You cannot legislate out complexity by dictum. It is a result of outside forces," John Keto, technical director at Wright Air Development Center, believes.

► **Mild Dissent**—Several panel members, representing equipment users, sound mild dissenting notes by urging continual vigilance against growing complexity:

• "A thorough study of mission requirements can sometimes reduce complexity . . . by complete elimination of some deluxe gadgets," suggests Henry Rempt, electronics and armament staff engineer at Lockheed Aircraft Corp.

Rempt adds this note of caution: ". . . The study (should) be made in the shortest possible time. . . . While you are working . . . (to get rid of a device), someone else will add three new systems."

• "We need more feedback of information from equipment designers to military services to tell us when the point of diminishing returns is reached in terms of complexity," says Maj. Gen. Gordon A. Blake, USAF Chief Communications Officer.

► **Evaluating Complexity**—Not only is complexity a relative matter, but it is a difficult thing to evaluate, Dr. Baker points out. In business, equipment and its complexity can be evaluated economically in terms of cost versus return.

However, in military science, return is measured not in dollars but in terms of tactical advantage, lives saved, sometimes in morale, Baker says. Cost involves not only money but time of development, time of maintenance and in reliability.

► **No Cure-All**—On the subject of reliability, Dr. Draper holds no hope for a cure-all solution. "Reliability is not a matter of a stroke of genius; it involves lots of perspiration and hard work on many individual improvements," he says.

Here are some suggestions by panel members:

• **More Development Time.** "One reason that equipment encounters so much trouble in the field is that it has not undergone sufficient development before being put into production," Draper says.

In reply, Maj. Gen. Clarence S. Irvine, deputy commander of the Air Materiel Command, points out that the Russians are the ones who set our military requirements and timetables.

• **Data For Designers.** "Industry must expend more effort in acquainting (its) designers with the realities of (field) service conditions," warns Arthur Van Dyck, staff assistant to the technical director of Radio Corporation of America.

WADC's Keto calls for better application engineering data on components to guide avionic designers. He cites the recent report by Aeronautical Radio, Inc., on tube reliability (AVIATION WEEK Apr. 5, p 52; Apr. 19, p. 56) as an excellent example of what is needed.

• **Fewer New Designs.** Van Dyck urges the Armed Services to put more emphasis on continuous production of existing equipment, cut down its number of new designs. Production should be scheduled for continuous flow to enable manufacturer to establish his processes, debug his manufacturing techniques and equipment design.

Panel moderator W. R. G. Baker (r) shown in Korea getting first-hand report on avionic reliability problems from Gen. Van Fleet.

"If you have only new designs, you will have 'bugs' all the time," Van Dyck warns.

• **Define Reliability Needs.** Reliability of equipment starts with the initial design, says Fred Henderson of Western Electric, who urges the military to spell out specifically what they need in reliability—i.e. how many hours of failure-free operation with what degree of certainty.

• **Factory Overhaul, Modification.** Henderson also urges that equipment be pulled out at regular intervals, like aircraft engines, and returned to the original manufacturer for overhaul and modification to incorporate latest design changes.

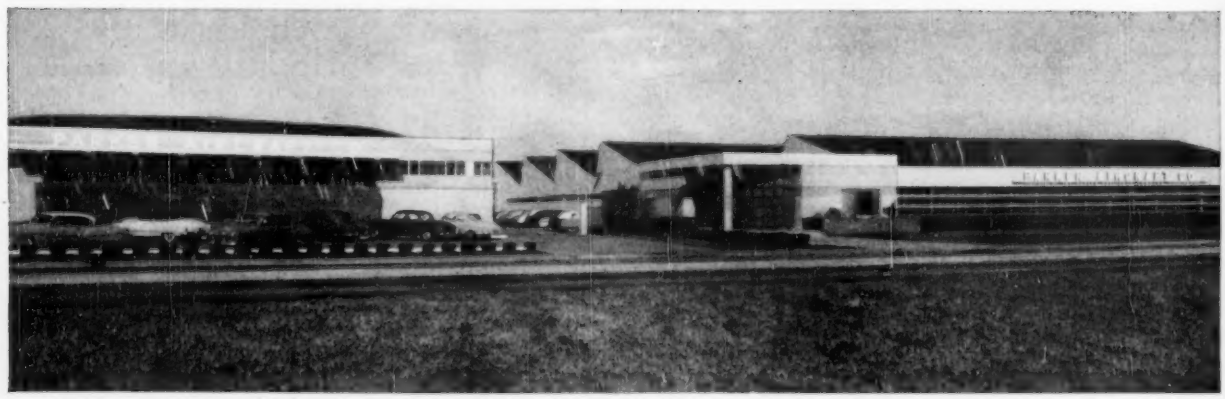
A similar recommendation comes from Dr. Draper, who calls for modification centers where equipment could be returned to have its performance improved, much as is done with aircraft.

• **More Reliable Components.** Several speakers call for intensified development of more reliable components, while acknowledging that considerable progress has been made in recent years.

Dr. Baker suggests: "It may be that some major break-through in the field of new materials will permit a major improvement in (component) reliability. . . . And there is much evidence that we are pressing many avenues of new component technique. . . ."

► **Military Doorstep**—RCA's Van Dyck

What kind of check



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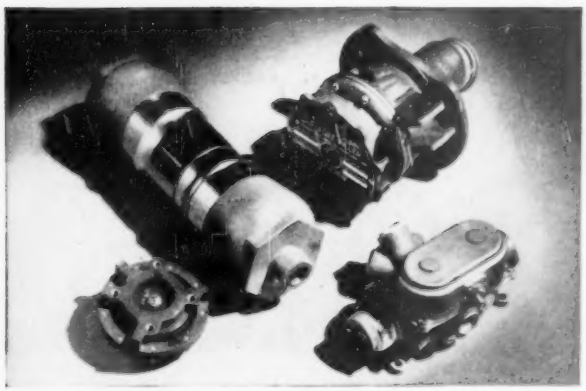

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puts partial responsibility for unreliability on the military services' doorstep by pointing out that industrial and commercial electronic equipment generally have proven reliable.

Although the difference in commercial and military equipment reliability may be explained in part by their different operating environments, Van Dyck does not consider this to be the principal factor. The significant reason, he says, is that industry introduces design changes gradually in its commercial equipment and minimizes the introduction of new models.

Van Dyck calls on the military to give "a very careful weighing, much more careful than there has been in recent years, of the expected advantages of something new . . . against the older equipment, which is . . . becoming thoroughly reliable."

He says the military should "make some sacrifice in desired characteristics to obtain the elusive, hard-to-get quality of reliability."

▶**The Military Reply**—Gen. Irvine replies that we must keep pace with our "competitors," the Russians, who have surprised us with their ability to improve on our equipment designs.

He cites a Soviet redesign of a U. S. automatic direction finder in which the number of electron tubes was cut from 25 to 14, with no sacrifice in performance.

Irvine also calls on industry "to apply the same order of engineering and management supervision to their military work as they put into commercial lines" as an important step toward improving military equipment reliability.

▶**Maintenance Problem**—One of the USAF's most pressing problems is the high turnover of its avionic maintenance personnel, Gen. Blake says. By the time these men are trained and get sufficient experience to become valuable, their term of enlistment is nearly over. Attractive salaries these men can get in industry hits hard at re-enlistment.

Unless the USAF is able to hold onto its present "post-Korea" crop of airmen, whose enlistment is up next year, maintenance efficiency will suffer a big drop, Blake warns.

▶**Better Maintainability Needed**—Recognizing that equipment failures always will be with us, several panel members make these suggestions for improving ease of maintenance:

• "We must move the military services out of the electronics 'nuts-and-bolts' business" by widespread use of plug-in subassembly construction, says J. F. Byrne, director of engineering for Motorola's Communications and Electronics Division.

If this is done, maintenance personnel need only understand the overall function of the plug-in unit, not its internal workings, Byrne adds.

• "Maintainability (must be) considered at every step during the original design," Rempt says. He urges avionic designers to make provisions for inflight testing and inflight maintenance wherever possible.

Van Dyck says one attempt to provide inflight test equipment was foiled by the aircraft manufacturer, who installed it in an inaccessible location near the tail of the airplane.

▶**Complexity vs. Plane Reliability**—Overall airplane reliability and its operational readiness goes down in geometric progression as "black boxes" are added, cautions T. H. McNary of Boeing Airplane Co., Wichita.

As unreliable black boxes are added to an airplane, the military must buy more aircraft in order to be assured of having an arbitrary number of them in combat readiness at all times, he says. Thus the cost of adding black boxes is more than just the cost of the boxes themselves.

A counter-argument, advanced by an unidentified speaker from the floor, points out that a black box added to an airplane actually may increase its "reliability" by better enabling it to carry out its mission successfully.

▶**Blood and Tears**—Van Dyck offers a favorable word for "the boys back in the labs and factories, who have been sweating blood and tears to make the equipment as good as it is—it could have been much worse.

"They have performed miracles in making the stuff work at all, under the conditions of the last 10 years, during which we have attempted to go too far too fast," he says.

Dr. Baker summarizes the complexity-reliability problem this way: "When we can get that level of reliability and service which precludes painful delays and lost motion from equipment breakdowns, we do not look so critically at the complexity of these devices."

New Servo System Devices Announced

A peanut sized vibrator-inverter for converting low-level d.c. signals to a.c. is one of several recently announced devices suitable for use in servo systems.

VIBRATOR-inverter is peanut-size.

The tiny vibrator-inverter is hermetically sealed, reportedly designed for high temperature and high shock encountered in aircraft and missiles. Unit, which plugs into seven-pin miniature tube socket, is available from Bristol Co., Waterbury 20, Conn.

Other new servo components include:

• **Size 10 synchros**, 0.937 in. dia. x 1.28 in., that weigh only 1.8 oz. and reportedly provide accuracy of 10 minutes of arc, come in many types: generators, repeaters, control transformers, control differentials, resolvers and sine-cosine generators. Technical details are available from Clifton Precision Products Co., Marple at Broadway, Clifton Heights, Pa.

• **Size 51 motor-generator,** approximately 1 in. dia. x 2⅝ in., weighs 4 oz. Motor is two-phase, 26-v. 400-cycle, with stall torque of 0.35 oz. in., input power of 3.75 watts. It has no-load speed of 6,500 rpm., with maximum moment of inertia of 2.9 gm. cm.², according to manufacturer. Tach generator output is 0.32 v./1,000 rpm., with a maximum null voltage of 0.023 v. Manufacturer is G-M Laboratories, Inc., 4300 N. Knox Ave., Chicago 41, Ill.

• **Miniature a.c. generator,** Type 44A, develops 33 v. of two-phase 20-cycle a.c. at 4,500 rpm., with output voltage proportional to speed. Unit weighs 8 oz., measures 1¾ in. dia. x 2⅛ in. Shafts can be supplied with splines, keyways or gears. Dalmotor Co., 1315 Clay St., Santa Clara, Calif.

• **Magnetic servo amplifiers** come in a variety of types with plug-in bases for use with two-phase a.c. servo motors and for operation from 60 or 400 cps. power. Ketay Manufacturing Corp., 555 Broadway, New York 12, N. Y.

• **Magnetic d.c. converter,** which converts low-level d.c. signals to phase-sensitive a.c., comes in two different types: Type MF, for 60- or 400-cycle operation, produces output voltage of same frequency as excitation voltage; Type MH output is second harmonic of excitation voltage, which may be 60 to 10,000 cps. The MH-1, designed for use with thermocouples, has an input resistance of 10 ohms, signal sensitivity of 10 microvolts, according to manufacturer. Model MH-3 has input resistance of 2,000 ohms and a d.c. sensitivity of less than 0.1 microampere. Magnetic Research Corp., 318 Kansas St., El Segundo, Calif.

• **Small electric clutches** for rapid control of low-torque drives are available in several models to handle static torque of 8, 60, or 240 lb. in., at rated speeds up to 10,000 rpm. Manufacturer says torque buildup with applied d.c. voltage is smooth. Company also makes small electric brakes. Devices are made by Warner Electric Brake & Clutch Co., Beloit, Wis.

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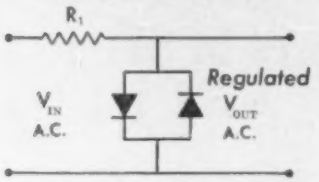

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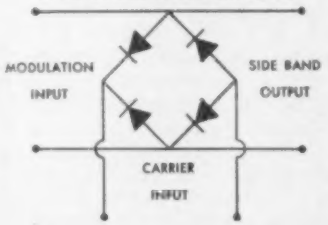

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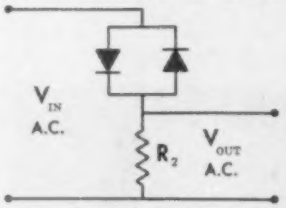

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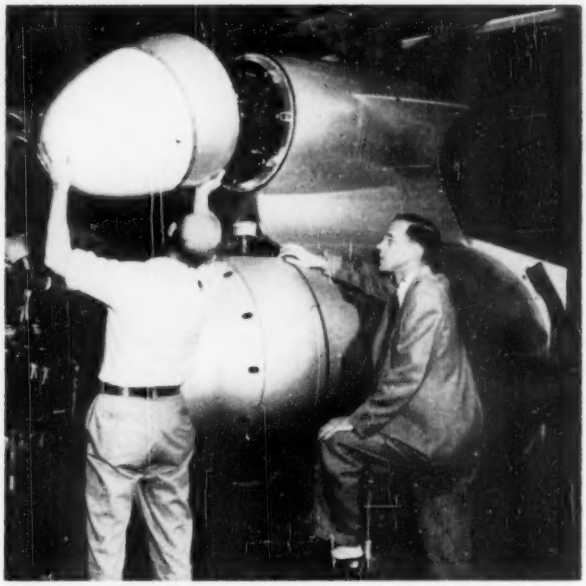

B-47E TAIL STINGER, G-E developed automatic radar-directed fire control system, is first to be made in a detachable pod.

General Electric-developed defensive armament system for the B-47 Stratojet is aimed by radar to give protection day or night. It is completely installed and shipped in a novel, detachable tail pod by GE and Avco's Crosley Division, second source on the armament.

Detachable tail pod arrangement, produced first for the B-47, permits entire complex system, consisting of radar, computer and turret, to be "harmonized" (electrically and mechanically aligned) before delivery to the aircraft manufacturer. This simplifies initial installation and permits speedy replacement in the field.

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▶ **Lear Autopilot for B-57**—The Lear F-5 autopilot, used in the F-86D and F-84G, has been selected for use in the Martin B-57, following a hot competition among autopilot manufacturers.

▶ **S-B Transistors Available**—High frequency junction transistors, made by the new Philco surface-barrier technique (AVIATION WEEK Jan. 4, p. 50), are now available in pilot quantities for use in government-sponsored contracts. Inquiries may be addressed to Chester Pond, Philco Corp., Government & Industrial Div., 4700 Wissahickon Ave., Philadelphia, Pa., and should include government contract number.

▶ **CAL Studies Weapon Systems**—Cornell Aeronautical Lab is conducting evaluation studies on search, fire-control and ordnance equipment of new weapon systems for tactical aircraft. CAL is also investigating automatically controlled carrier approaches for jet aircraft and the use of artificial stability devices (dampers) for improving helicopter flight characteristics.

▶ **Swiss Buy Bendix GCA**—The Swiss military establishment's technical department has purchased three Bendix Radio mobile GCAs at a cost of $1.5 million, the company reports.

▶ **F-100, F-101 Simulators**—Flight simulators for the North American F-100 and the McDonnell F-101 are under development at the Melpar Div. of Westinghouse Air Brake Co.

▶ **New UHF Power Triode**—New lightweight (8 oz.) power triode, the 6383, designed for airborne communications use at frequencies up to 2,000 mc., has been announced by RCA's Tube Div. New tube has a maximum plate dissipation of 600 watts, measures 1¾ in. dia. x 4¼ in., requires liquid cooling.

▶ **New Marker Beacon Receiver**—New miniaturized marker beacon receiver, the ARN-32, developed by Crosley for USAF, is reportedly only one-third as heavy and as large as its ARN-12 predecessor, uses only one-third as much power. —PK

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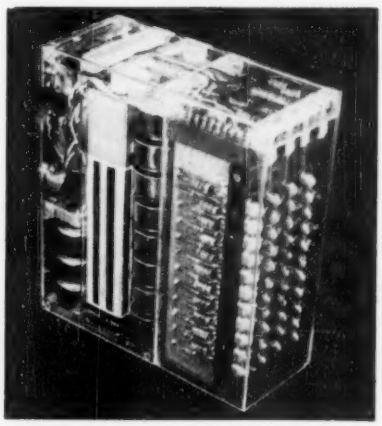
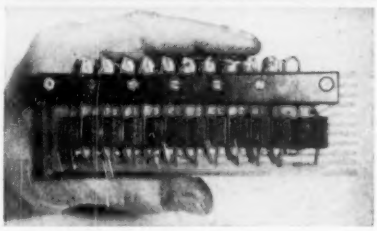
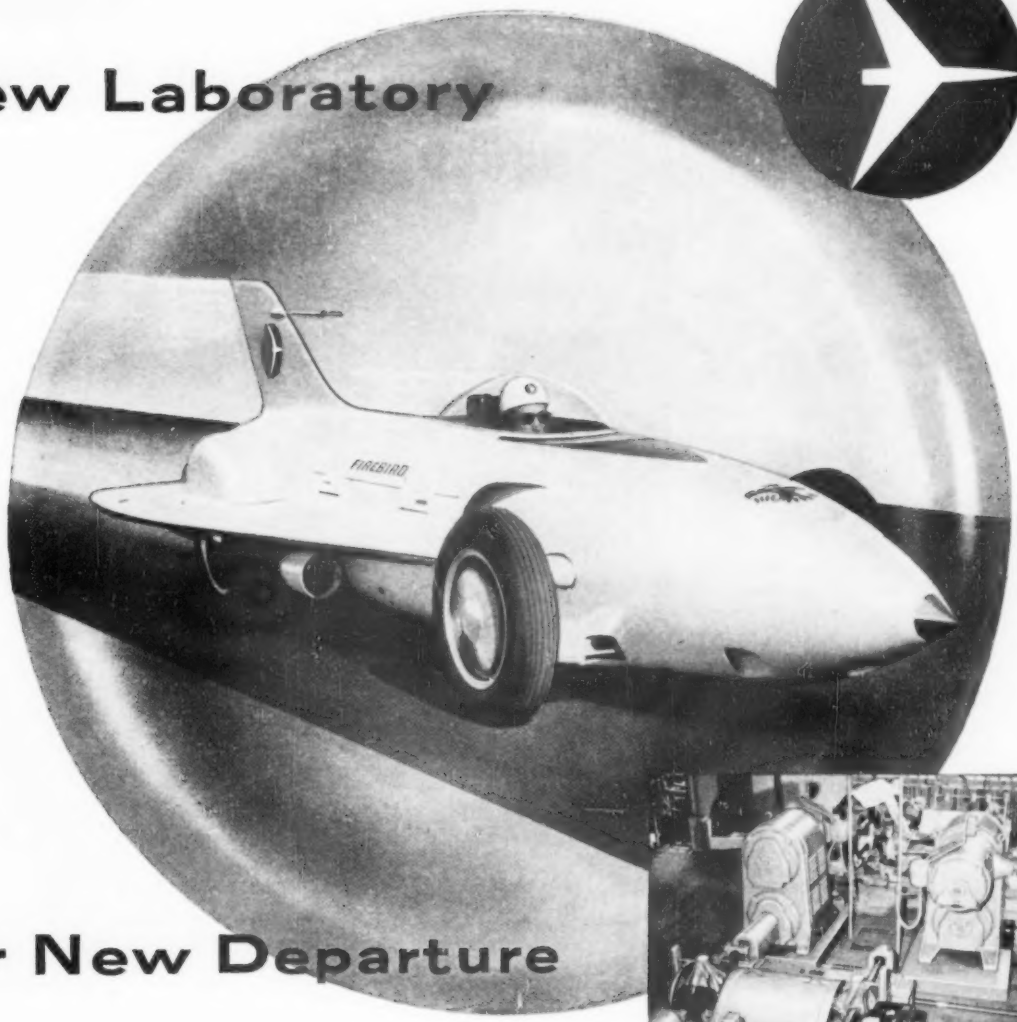


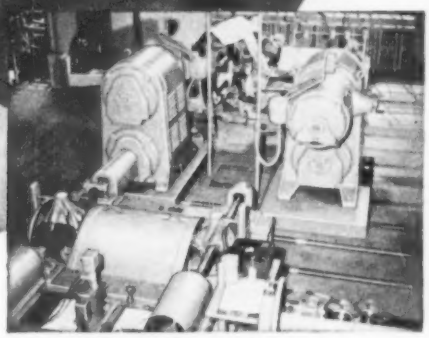


Transistorized Counter

Portable transistorized decade counter (top), containing four decades and battery power supply, can operate at counting rates of 0 to 100 kc. Unit was designed by Hydro-Aire Inc. to demonstrate interesting applications of its transistor products. Decade cards (bottom) weighing 2¼ oz. and requiring only 180 mw. power, have row of indicating bulbs to give visual indication of their count. Hydro-Aire point-contact resistors can be seen behind bulbs. Transistorized decades are available in limited quantities from Hydro-Aire, Burbank, Calif.

New Laboratory for New Departure





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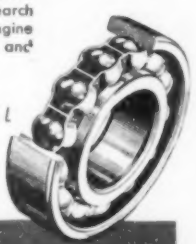

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Pumps Keep Abreast of New Jet Needs

• Pesco engineers design fuel systems and hydraulic devices to meet demands of turbine powerplants.

By George L. Christian

Bedford, Ohio—Pesco Products Co.'s pump engineers here are busily engaged in keeping stride with the rapid advancements in the art of delivering ever-increasing quantities of fuel to gulping jet powerplants and afterburners.

At the same time they are engaged in a major development effort to design aircraft hydraulic pumps to withstand higher speeds, temperatures, pressures and new type, of high-temperature hydraulic fluids.

▶**Single Package**—One notable trend evident here is the tendency toward packaging all jet engine and afterburner fuel pumps in a single unit. Example is Pesco's Model 022717-011 pump, which is actually three pumps in one. Fuel goes first to a centrifugal booster pump which feeds two gear-type pumps in parallel. One supplies the engine, the other the afterburner. And Pesco is already experimenting with a four-element pump—one centrifugal and three gear-type.

J. A. Compton, Pesco's assistant chief engineer-fuels, points out this patented feature of the Pesco multiple gear-type pumps:

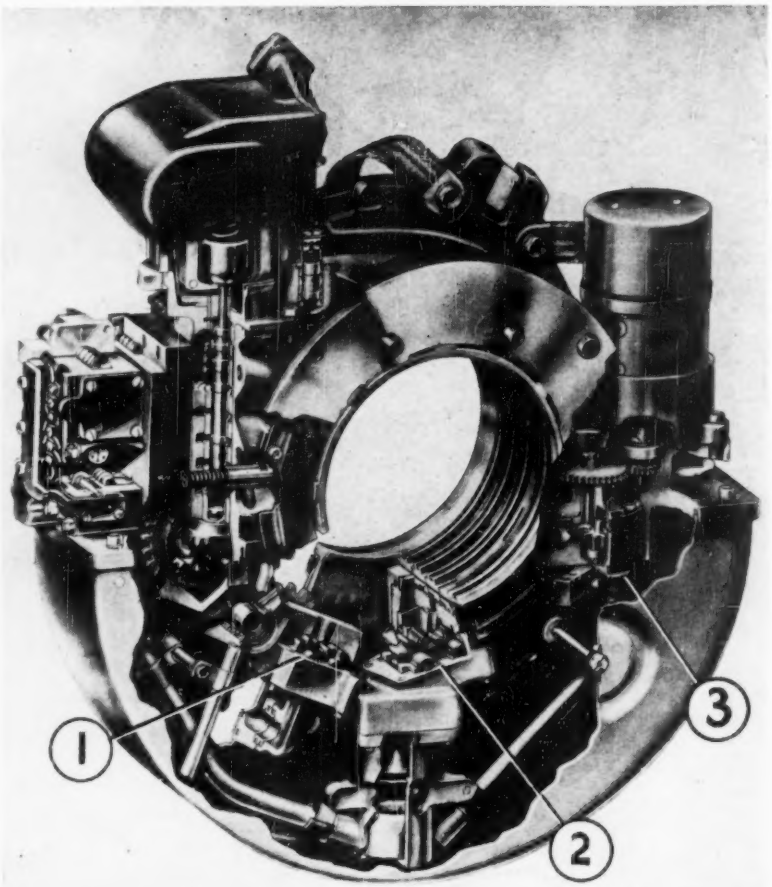
Coaxial construction of the shaft-to-gear element incorporates the shear section on the gear instead of on the shaft. This means that in case one of the pumps fails in a series, the other continues to turn, supplying sufficient fuel to allow the engine to develop full takeoff power at sea level.

▶**Single Package Advantages**—There are several advantages to wrapping all fuel pumps in one package, according to Compton. Among them are:

• **Elimination of excess plumbing** that is required in the case of multiple pumping units. This in turn means space saving, cleaner plumbing, greater accessibility and the need of but a single engine drivepad for all pumping requirements, which is important on a jet engine where drivepads are scarce.

• **Single shaft seal** (because of series construction) means but one possible source of leakage in case of failure.

Compton says this was a small, but important point. He adds that should the seal fail, there would be no appreciable effect on the pump's operation.



CUTAWAY of a propeller's integral oil system reveals three Pesco cartridge pumps.

To consolidate fuel system components even further, Pesco has incorporated integral, built-in fuel filters in the pump package. And the company is now building pumps with pads to accommodate the fuel control so that it too may become part of the package.

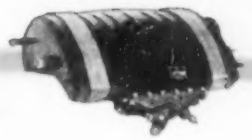
▶**Major Trends**—An important trend that Pesco officials see in fuel system design is the move toward elimination of emergency fuel pumps. They say this is possible because the basic reliability of the pressure-loaded gear pump design "is so high as to warrant such action without incurring undue risks." The company says that there is a plane flying today without any emergency fuel pump, and that weight and size of the basic pumping unit has been cut 40% by this elimination.

Pesco notes that other important trends are the development of higher-pressure pumps for new, higher-pressure-ratio engines, and use of increased rotational speeds to keep pump weight and size down as much as possible. However, higher speeds multiply mechanical problems in pump design and manufacture, the company points out.

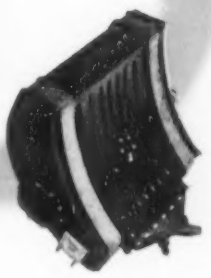
▶**On Every Jet**—Pesco has supplied fuel pumps for every jet engine ever flown or operated in this country, from the venerable General Electric IA which powered the first U. S. jet aircraft—the Bell P-59 Airacomet—to the latest.

Currently, the major production pump is the Model 022664-021, destined for the Wright J65 Sapphire, a 7,200-lb.-plus-thrust engine. Unit consists of dual gear pumps in parallel,

(*Continued on page* 69)



FLIGHT ATTITUDES and OIL TANKS



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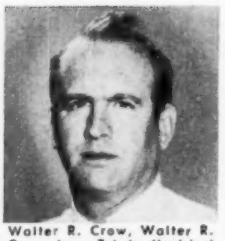
Robert F. Wood, Newport Air Park, Newport, Rhode Island.

George Harte, Harte Flying Service Inc., Chanute Municipal Airport, Chanute, Kan.



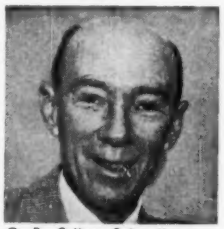
Walter R. Crow, Walter R. Crow, Inc., Toledo Municipal Airport, Walbridge, Ohio.

B. G. Vandre, Van's Air Service, Municipal Airport, St. Cloud, Minnesota

C. W. "Wayne" Crussell, Southern Aero, Inc., Municipal Airport, Atlanta, Georgia.

Cheston M. "Chet" Newhall, The Babb Co. (Canada) Ltd., Montreal Airport, Dorval, P.Q

Art Maurer, Arthur Maurer Co., Inc., LaGuardia Field, New York, N. Y.



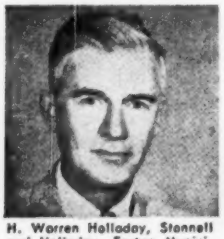
O. B. Callan, Sales Manager National Aero Sales Corp., Midway Airport, Chicago, Ill.

Don Hood, Air Sales and Service Company, Weir Cook Municipal Airport, Indianapolis, Indiana.

Peter Graves, Southern Ohio Aviation Company, Inc., Dayton Municipal Airport, Vandalia, Ohio.

Ray I. Wilson, Manager, Downtown Airpark, Inc., 1800 South Western, Oklahoma City, Oklahoma.

Don Vest, Vest Aircraft & Finance Co., P. O. Box 5306, Sky Ranch Airport, Denver, Colorado.



H. Warren Holloday, Stonnell and Holloday, Easton Municipal Airport, Easton, Md

Don Pennington, Carolina Aero Company, Asheville-Hendersonville Airport, Fletcher, North Carolina.

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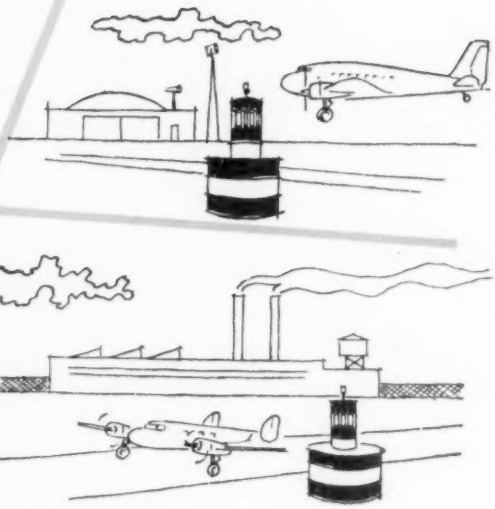

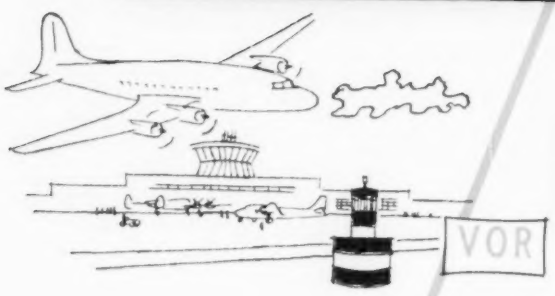

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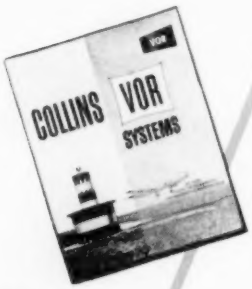

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(Continued from page 64)

both fed by a centrifugal booster. Pump delivers 40 gpm. at 600 psig. at 3,690 rpm. and weighs 23.5 lb. Size is approximately 11¾x6x6 in.

Largest pump in production is the Model 022717-011. This too is a centrifugal booster-fed, dual gear-type pump. This unit delivers fuel at 750 psi. It furnishes a total of 115 gpm., approximately 40 gpm. to the engine and 75 gpm. to the afterburner. Pump weighs 51 lb. and measures 17¼x8x9 in. It is used on Pratt & Whitney Aircraft's J57 which powers such new planes as the F4D, F-100 and F-102.

Because of the trend towards higher pressures, Pesco has in full production a single-gear fuel pump which operates at 1,000 psi. Experimentally, the company is testing a unit in the 1,500-psi. class.

To keep up with ever-increasing fuel consumptions, Pesco has in development a dual pump which will deliver up to 200 gpm. for engine and afterburner.

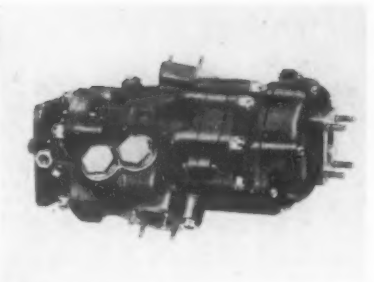
Pesco officials say that their Model 2P739F has been practically the standard fuel pump for the jet engine industry. Over 30,000 have been built and the unit is still in production for the GE J47. A majority of the 2P739F pumps produced went on to J47-equipped B-47s, says Pesco. Lesser quantities equipped J33s and early J35s.

The company sees no trends towards standardization of fuel pumping equipment; on the contrary, it feels a trend towards specialization instead.

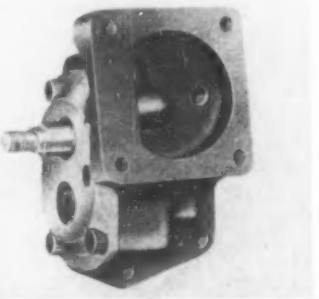
▶**Hydraulic Units**—E. A. Schanzlin, Pesco's assistant chief engineer-hydraulics, told AVIATION WEEK that his department is concerned with problems similar to those being faced by the fuels group: Higher pressures and speeds are required in hydraulic pumps as well as higher operating temperatures.

Pesco is in production on 3,000-psi. hydraulic pumps and is experimenting with units up to 5,000 psi. In speeds (for which the gear-type pump is ideally suited, says Schanzlin), production pumps turn up as high as 6,000-8,000 rpm., while models in limited production have reached 12,000 rpm. Even at speeds as high as 12,000 rpm., Pesco gear-type pumps can operate with as little as 25 psia. inlet pressure because inlet porting losses are very small, Schanzlin says.

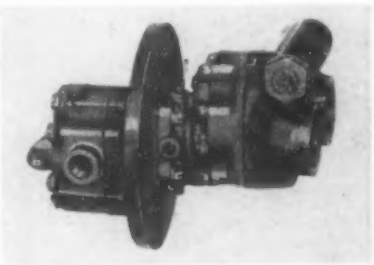
▶**Emergency Turbine**—One application for which these highspeed pumps are being used is as an emergency, high-speed, ram-air-turbine-driven hydraulic pump to supply hydraulic pressue if the plane's main system becomes inoperative. To operate, ram air turbine and hydraulic pump are extended into the airstream, which turns the turbine at high speed.



PESCO 022664 dual fuel pump is used in Wright J65 Sapphire turbojet engine.



CARTRIDGE PUMP is a sample of those used in Hamilton Standard prop oil system.



HYDRAULIC PUMP drives engine oil from main to nacelle tanks in Super Connie.

The gear pump is suitable for this use because, being able to turn fast, it can be mounted on the turbine drive with a 1-1 ratio, eliminating weight and cumbrousness of reduction gearing. As for the pumps themselves, they are relatively small and light.

▶**Cartridge Pumps**—A specialty item among pumps is the Pesco cartridge unit. Schanzlin defines a cartridge pump as one which "mounts internally in another assembly and becomes integral with that assembly. It is usually designed without seals and external fluid connections." He foresees a trend toward increased application of this type of pump in aircraft.

Currently, a primary application of cartridge pumps is in the "independent oil systems" made by Hamilton Standard which hydraulically control propellers on such aircraft as the Boeing C-97, Fairchild C-119 and Chase C-123. In these systems, which use MIL-015606 oil, cartridge pumps are used as the main propeller governing pump, scavenger pump and auixiliary, electric-motor-driven propeller feathering pump.

As the name implies the independent oil systems contain their own, separate oil systems, independent of the engine's oil (which is used to control propeller blade angle on most smaller Ham Standard installations).

Pesco says that Aeroproducts have long used catridge pumps for the same general purposes in their propeller control systems.

Another all-hydraulic component made by Pesco is a motor driving a hydraulic pump. This is used on some Lockheed Super Constellations to transfer engine oil from fuselage reserve oil tank to engine oil tanks as the latter become depleted.

In the pilotless plane field, Pesco has electrically driven hydraulic pumps installed on the Chance Vought Regulus guided missiles. They, along with the Martin Matador missiles, also mount Pesco engine fuel and fuel booster pumps, according to the company.

▶**A.C. Pump Drives**—Ray Holt, Pesco's general sales manager, told AVIATION WEEK that Pesco pioneered in research to develop successful alternating current electric motor drives for pumps.

This type of drive is particularly useful for submerged booster pump installations; because motor is a.c. and has no brushes and cannot arc, fuel may freely enter. This eliminates troublesome seals between pump and motor.

Advantages of the three-phase, 400-cycle a.c. electric motor-driven pump are: weight and space savings due to light construction and small size of the motor. Elimination of brushes and commutators helps to prolong service life and improve high-altitude performance of the motor whose bearings are lubricated by the fuel in the motor.

▶**Metallurgical Lab**—To make sure that bar stock received is what it is supposed to be, Pesco saws a sample off each piece as it arrives in the receiving department.

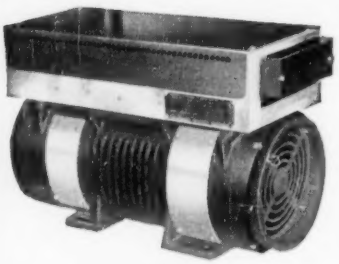
The samples are sent to a fully equipped metallurgical laboratory where they are checked for, among other things, hardenability, chemical makeup and structure.

The lab also is responsible for chemical analysis, electroplating control, bar stock control, casting control, rubber and plastics control, control of heat treating procedures, including nitriding, Magnaflux and Zyglo inspection, administration, and materials review.

▶**Wooster Plant**—A new plant, similar in many respects to the Bedford factory, was opened in Wooster, Ohio, in December 1952. This new unit will serve as an additional manufacturing facility for Pesco pumps. The plant, all of

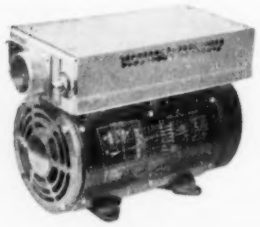
Bendix Red Bank

HIGH ALTITUDE INVERTERS



Type 32E03-3

Bendix Red Bank 32E03-3 and MG-54 Inverters give the continuous full AC power output needed to operate flight control instruments, radio communications and radar at today's higher altitudes and ambient temperatures. These two high altitude champions make the customary de-rating at higher altitudes unnecessary. They can deliver this outstanding performance because they have been specifically designed for high altitude operation and are not simply modernized versions of older designs. Further, their integral voltage and frequency controls enable them to hold the close tolerances required in modern aircraft.



Type MG-54

Specifications
Type 32E03-3
(Conforms to USAF drawing 53B6227 and AN-I-10b)

Input DC	
Voltage Range	26 to 29
Current Range	160 to 180
Current at 27.5 volts	165
Output AC	**Single Phase**
Volts	115 ± 4%
Amperes	21.7
Volt-Amperes	2500
Frequency-cps	400 ± 10
Power Factor	.9 lag to .95 lead
Efficiency	55%
200% load	5 sec.
150% load	5 min.

WEIGHT: Approximately 62 pounds.

MAXIMUM OVER-ALL DIMENSIONS: 7¼" wide x 11¼" high x 17" long.

ALTITUDE	AMBIENT TEMP. RANGE
Sea Level	−55°C to +85°C
35,000 ft.	−55°C to +40°C
50,000 ft.	−55°C to +20°C

Type MG-54
(Conforms to Navy drawing E-51A1A9 and MIL-I-7032)

Input DC	
Voltage Range	26 to 29
Current Range	24.1 to 21.6
Current at 27.5 volts	22.8
Output AC	**Three Phase**
Volts	115/200 ± 4% (115 ± 4% single phase)
Amperes	1.25/.723 (2.17, single phase)
Volt-Amperes	250 (single phase, three phase, or single and three phase combined)
Frequency-cycles/sec.	400 ± 10
Power Factor	0.8 lag to .95 lead
Watts at 0.8 PF lag	200
Efficiency	40%
200% load	5 sec.
150% load	5 min.

WEIGHT: Approximately 17 pounds.

MAXIMUM OVER-ALL DIMENSIONS: 5½" wide x 8" high x 12" long.

ALTITUDE	AMBIENT TEMP. RANGE
Sea Level	−55°C to +85°C
50,000 ft.	−55°C to −10°C
65,000 ft.	−55°C to −10°C

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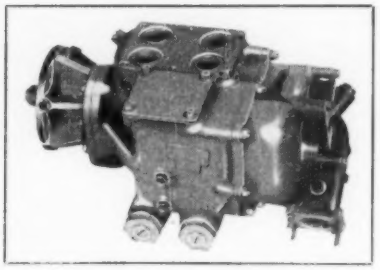


PESCO OIL PUMP, used on P&WA J57 turbojet, consists of centrifugal booster, two gear-type pumps in parallel.

whose production is for the aviation industry, reached peak production (about 60% of capacity) in December, 1953. Maximum capacity is approximately 100,000 units a year.

Wooster is an almost completely self-sufficient unit, according to Ed Whalley, the organization's vice president. Only outside purchases are rubber materials, castings and standard hardware. This plant has developed its own sources of supplies, almost completely different from the Bedford facility. The Wooster division.

The division has a total square area of 104,000 sq. ft. compared to Pesco's total 268,000.

Air Force Getting Flying Photo Labs

Dayton—Six basic "flying" photographic laboratories developed by engineers at the Air Materiel Command in cooperation with private manufacturers are now in production for the Air Force.

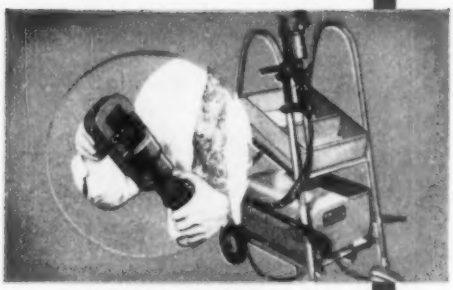
Designed for transport inside the Fairchild C-119 Packet to advance bases throughout the world, the labs are self-contained in standard, highway-type truck trailers; each can print 10,000 photos a day and be ready to operate within two hours after being landed.

The air-transportable units weigh 15,000 lb. each, completely equipped. They cost about $40,000, of which $15,000 is the price of the 7,800-lb. aluminum trailer.

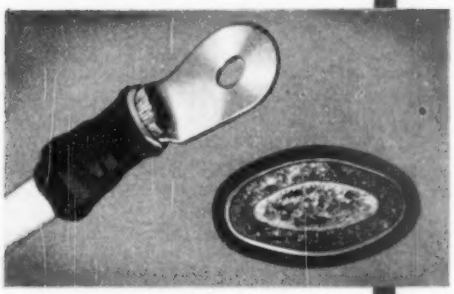
The laboratories are built in six basic units, with 11 variations for the particular needs of photo reconnaissance squadrons. The basic types include units for radar processing, special films, and maintenance and repair of camera equipment.

Basic design problem of the flying labs was to contain all needed equipment in a mobile "package" which could be accommodated by the versatile C-119 without disturbing its center of gravity. Result is a completely engineered workshop in which even the

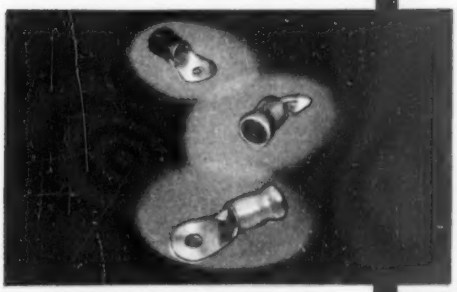
The first and only LARGE SIZE terminal with BONDED INSULATION.



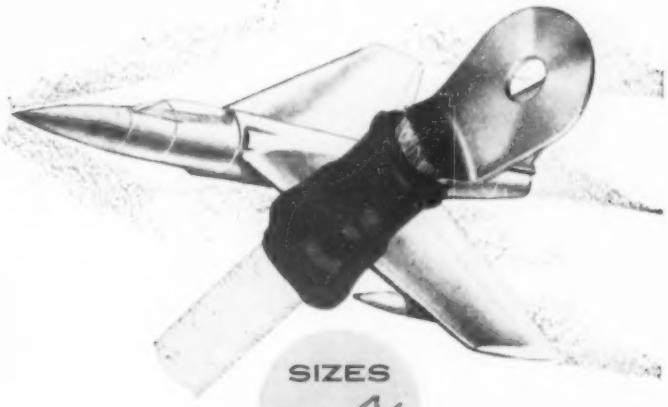
NEW DYNA-CRIMP TOOL
New, powerful, DYNA-CRIMP tool features fast positive crimping action and easily-opened swivel head. Crimping heads can be changed easily. A-MP DYNA-CRIMP tool gives maximum portability with remote control operation. Interchangeable dies are available for use with A-MP's complete line of Aluminum and Flag terminals. Shown above with moveable cart to transport power unit providing maximum flexibility for Bench-Production line use.



BONDING FEATURE MOST IMPORTANT
Bonded insulation is the most important factor *in producing a successful insulated terminal.* The positive and complete bond of the insulation to the terminal sleeve insures uniform insulation thickness under crimping pressures, and therefore transmits this pressure evenly to the center of the crimp area. With this precision-engineered A-MP crimp and BONDED insulation you can be sure of maintaining proper dielectric and tensile values in the finished connection. More intimate contact achieved by confining, over a greater area, terminal and wire under intense crimping pressure.



OTHER IMPORTANT A-MP "FIRSTS"
Completely separate metallic reinforcing ring grips wire insulation, prevents exposure of conductor during sharp bends, cable fatigue caused by flexing and vibration and forms a barrier to foreign objects coming in contact with current carrying members. New helical tongue design gives maximum strength with minimum weight.



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Here is a large size terminal that presents to the users of heavy duty wire the same quality connection that has made A-MP famous for PRE-INSULATED type terminals throughout the industry. Write today for information about AMPLI-BOND and new powerful AMP DYNA-CRIMP portable pneumatic-hydraulic crimping tool.

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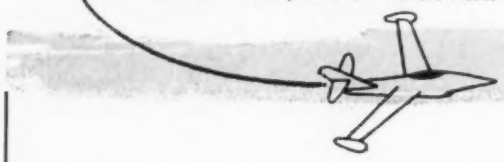


The insistent clamor of the warning buzzer empties the alert room in seconds.

Pilots and radarmen tumble off bunks, spill domino games and playing cards, discard sandwiches and coffee in their rush for the door.

A few strides and they're racing into the adjoining hangars, climbing into the Starfires with the help of ground crewmen summoned on-the-double by the same warning.

The fore-and-aft hangar doors swing open overhead.

Engine starters pound into operation.

The jets come alive in a blast that turns into a high-pitched whine, then a piercing scream . . .

It's a fighter-interceptor scramble – and it may be for real.

Throughout the various Air Defense Identification Zones ringing the vital approaches to the nation, units of the Air Defense Command are constantly awaiting the buzzer's call, the order to scramble aloft for a check of unidentified aircraft.

When I first rode with them it took a little more than five minutes to get two fighters airborne. That was in 1951.

Recently – by my stopwatch – I saw two interceptors airborne in exactly 2 minutes 45 seconds after the buzzer sounded, another two more 47 seconds later. That's fast going.

Every action is cut to a minimum to get the ships in the air, then rehearsed interminably until it's almost involuntary. Air crewmen wear their G-suits, their Mae Wests while on duty. Their parachutes and helmets are buckled on in the cockpits by their crew chiefs. The ships are started in the hangars, roll but a few scant yards to the head of the runway.

Initial order from the fighter director at a hidden radar site might be: "Vector two-seven-zero . . . Angels three-zero...Call Top Hat...Channel eight." In other words, a climb-out heading of 270 degrees, with the "bogie" at 30,000 feet.

A series of cryptic radio orders and acknowledgements follow as the flight of four ships knifes upward, vectored by radar to the final – and best-position – heading for intercept.

Then, from the fighter director, the word "Punch" or "the next blip you see on your radar screen will be your target." And from the pilot a few seconds later: "Judy!"..."Contact!"

Up to now there has been no electronic "lock-on," no flashing attack dive, no automatic firing of rockets that means a tangle with a real "bogie."

But the crews never know when there will be such a tangle and they fly with tanks full and rockets armed.

Perhaps 50 times a month the crews of any given squadron will spring into action and whip their interceptors off the runway for an intercept that proves to be but a military aircraft off course or a transport that has failed for some reason to follow proper identification procedures for entering an ADIZ...or maybe the pilot of the approaching craft is out of his assigned corridor or has failed to make certain check turns.

If he can't be identified in routine action, he must be checked out by interceptors.

Whether they're flying one-man F-86D Sabre jets, or two-place F-94C Starfires or the longer-ranging two-place F-89D Scorpions, the young men who crew these interceptors are all the same in any Air Defense Command outfit, jovial, garrulous, easy-going, relaxed – until the buzzer sounds.

Then they're tense, spring-steel action with a single purpose – get up there, and fast! They know that seconds may count . . . one day . . . or one night.

And don't for a minute discount them in these days of the nation's initial guided missile installations. They'll be the spearhead of our aerial defense for some time to come, in the ships they fly now and in the faster, harder-hitting interceptors of the future.

Ground-to-air missiles will be second-stage, inner-ring defenses to knock down enemy planes that slip by the manned interceptors. For it is not anticipated these squadrons can stop a full-scale attack.

In the first place, let's face it, there aren't enough of them.

But once you've seen them roll, flown with them, followed the perfect precision of their intercepts and watched sea and sky whirl through crazy circles in mock combat, it's damned comforting to know they're waiting in those alert shacks while you sleep – waiting for the buzzer that rules their lives.

stance of technicians processing film has been carefully studied for arrangement of equipment and elimination of excess motion.

To make the units relatively independent of local water supply, they are fitted with ion-exchange systems which remove chemicals and impurities from the water used for film processing, so it may be reused indefinitely. About 360 gallons per hour are needed.

The labs are air conditioned for accurate control of photo processing and printing in any climate. Each unit has an operating staff of five.

The Air Force hopes to supply each photo recon wing with 26 of the flying labs. A wing consists of two day squadrons, one night squadron and a squadron of ground technicians.

Lake Central Adopts TCP for DC-3 Fleet

Lake Central Airlines reports a marked reduction in spark plug fouling at the end of a six-month test with Shell's TCP (tricresyl phosphate) additive in aviation gasoline.

The Indiana-based local service airline conducted its test using TCP on two of its seven DC-3s. Conclusion reached by the airline: "The control test . . . has given clear indication that the severe spark plug fouling encountered in shorthaul service can be reduced materially by the inclusion of TCP in the gasoline."

Lake Central found only five fouled plugs during the 1,000-hr. test on its two control aircraft, while the other five DC-3s required a total of 221 premature plug removals because of lead fouling. This averages out to 2.5 plugs per plane removed from the TCP ships compared to 44.3 removed from the non-TCP craft.

Lake Central found that TCP plugs

Hut on Stilts

Quonset-type hut was placed on 7-ft. stilts by Chance Vought so that F7U-3s coming off assembly line at Dallas are provided with ample ventilation for dispersing volatile fumes during testing of the aircraft's fuel system. The steel shed is manufactured by Wonder Building Corp. of America. Stilt idea was Chance Vought's.

TIMKEN® bearings in new DC-7 wheels take 61-ton wallop at 100 mph

EVERY wheel bearing in Douglas Aircraft Company's new DC-7 has to be able to take the tremendous shock load of over 1,000 landings a year—without even the slightest chance of failure! That's why Goodyear engineers mounted the wheels for this plane on Timken® tapered roller bearings.

Timken bearings can handle shock loads like this because they're hard on the outside, tough on the inside and made from our own steel. We're the only bearing manufacturer that makes its own steel. It's the only way we can assure durability and quality in every bearing.

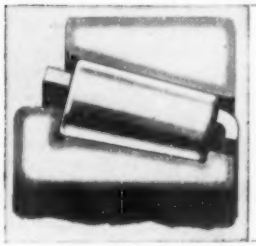
Even in a cross-wind landing, Timken bearings can take the sudden thrust load with ease. Their tapered construction enables them to take thrust as well as radial loads. And the wide line contact between rollers and races gives Timken bearings load-carrying capacity to spare.

Other Timken bearings in the brake installations minimize wear and maintenance. The true rolling motion and incredibly smooth surface finish of Timken bearings practically eliminate friction.

To get all these advantages in the equipment you build or buy, always specify Timken bearings. And always look for the trademark "Timken" stamped on every bearing. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".

This symbol on a product means its bearings are the best.

How **GOODYEAR AIRCRAFT CORP.** mounts the landing wheels of the new Douglas DC-7 on Timken bearings to assure long life, trouble-free service under heavy shock loads.



HARD ON THE OUTSIDE, TOUGH ON THE INSIDE

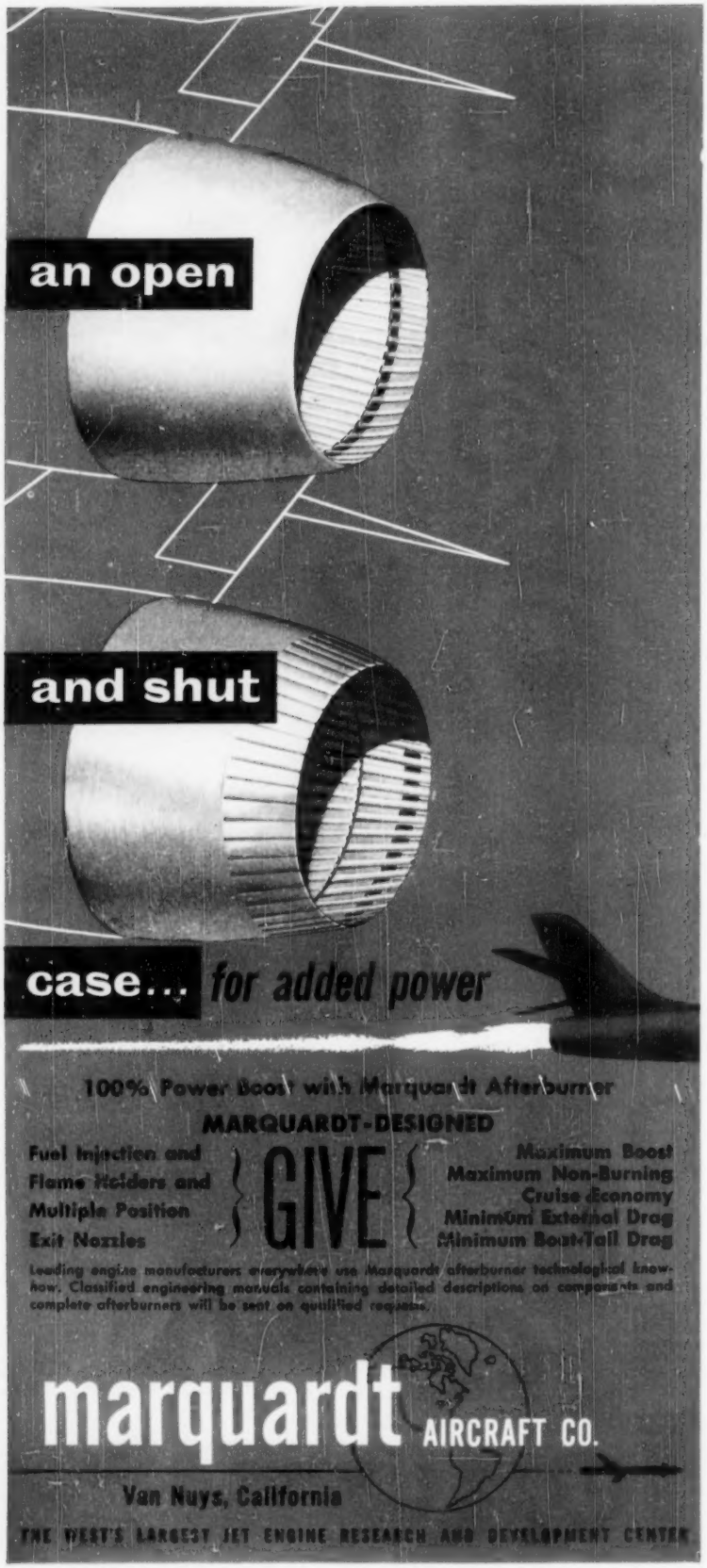
Rollers and races of Timken bearings are case-carburized to give a hard, wear-resisting surface and a tough, shock-resisting core. Result: longer bearing life.

The Timken Company leads in: 1. advanced design; 2. precision manufacture; 3. rigid quality control; 4. special analysis Timken steels.

TIMKEN

TAPERED ROLLER BEARINGS

NOT JUST A BALL — NOT JUST A ROLLER — THE TIMKEN TAPERED ROLLER BEARING TAKES RADIAL AND THRUST LOADS OR ANY COMBINATION


an open
and shut
case... for added power
100% Power Boost with Marquardt Afterburner
MARQUARDT-DESIGNED
Fuel Injection and Flame Holders and Multiple Position Exit Nozzles
GIVE
Maximum Boost
Maximum Non-Burning Cruise Economy
Minimum External Drag
Minimum Boat-Tail Drag
Leading engine manufacturers everywhere use Marquardt afterburner technological know-how. Classified engineering manuals containing detailed descriptions on components and complete afterburners will be sent on qualified request.
marquardt AIRCRAFT CO.
Van Nuys, California
THE WEST'S LARGEST JET ENGINE RESEARCH AND DEVELOPMENT CENTER

are cleaned more easily because deposits on the hot end are soft and powdery, increasing life 33⅓ %. This saving, plus increased passenger revenues resulting from reduced delays, can result in a yearly saving of approximately $6,000 a year, according to the airline.

Based on teardown tests of two TCP engines at the 1,000-hr. overhaul period, Lake Central concluded: ". . . The use of TCP as a fuel additive causes no perceptible damage to any part of the . . . engine."

The carrier says that, as a result of these tests, it now intends to include TCP in all the fuel used by its aircraft.

OFF THE LINE

New Mercator B-4 computer, in both high-speed and standard versions, is now available in Canada through newly established Coltex Trading Co. The computer, made in Holland, is used by many airlines and the military and is being tried by the Royal Canadian Air Force, according to Coltex. Address: 4750 Planmondon Ave., Apartment 19, Montreal, Canada.

Shell Oil Co. has developed a pumping system for aircraft refueling trucks that raises pumping rate from the current 160 gpm. to 225 gpm. The system features a jet eductor (a mortorless pump employing the venturi principle). This speeds up fuel flow and permits use of lightweight, collapsible hose instead of the heavy, rigid hose now in common use. Shell is planning to make the system available without cost to the oil and aviation industries. The company estimates that adaptation of the jet eductor to fuel pumping systems will save approximately $3,000 per refueling units.

Mohawk Airlines has awarded Dallas Airmotive, Inc. a contract to overhaul the R1340 engine which powers the carrier's Sikorsky S-55 helicopter. The Dallas concern has had an overhaul contract with Mohawk for five years to overhaul the airline's DC-3 R1830 powerplants.

Airponents, Inc., has moved its Civil Aeronautics Administration Repair Agency #3591 to larger quarters at 660 Rockaway Turnpike, Lawrence, L. I., N. Y., adjacent to New York International Airport. Company has new Greer Hydraulics equipment to test reversible pitch propellers, Woodward and Eclipse-type electric heads, and test stands to handle variable-displacement hydraulic pumps. The firm states it is an authorized overhaul agency for Bendix, Stromberg, Eclipse and Thompson.

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Progress in aviation brings a continuing demand for ever better and more efficient equipment to safeguard the men who fly.

ARO is proud to have a hand in this vital role of pilot protection. For example—Aro's new "Anti-G" Valve (shown here) is widely used to protect jet pilots today . . . an application which meters compressed air into the pilot's "Anti-G Suit" to prevent "blackout" in turns, dives or climbs.

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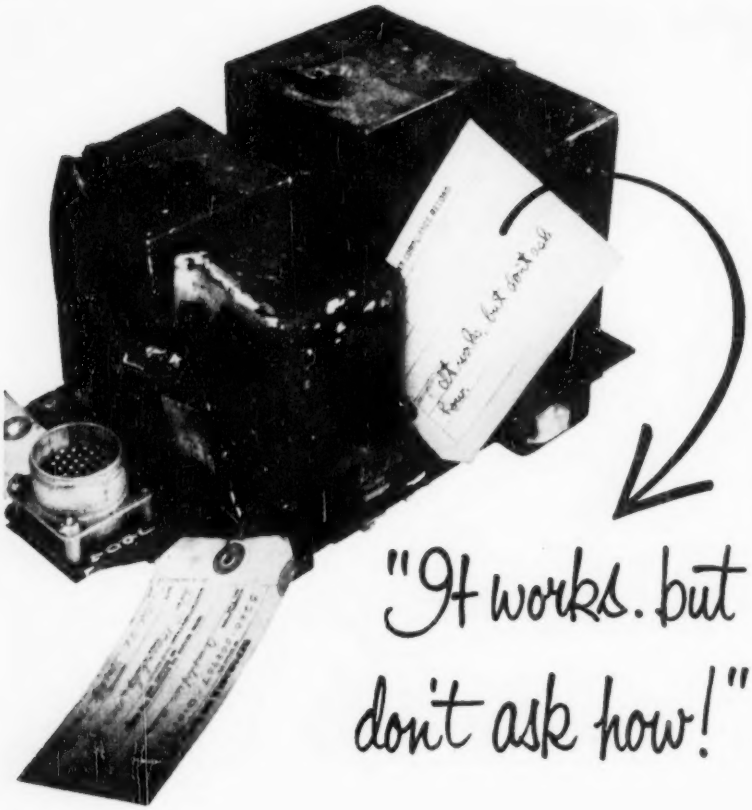


That's what the Tech Sergeant wrote after inspecting this Servomechanisms, Inc. electronic computer that came out of a wrecked fighter in Korea.

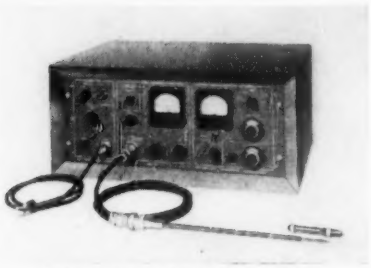
The specs didn't call for operation after this kind of treatment — but we're not surprised. We build reliability and ruggedness into *all* our equipment.

SERVOmechaNISMS INC.

PACKAGED FUNCTIONAL COMPONENTS

Designed and Produced at El Segundo, California and Westbury, New York

NEW AVIATION PRODUCTS



NEW AID for fluid flow studies.

Anemometer Measures Velocities Accurately

An improved hot-wire anemometer for accurate measurement of average velocity, large velocity fluctuations and turbulence in fluid flow has been introduced by Flow Corp.

Company notes that the only required accessory equipment is an oscilloscope. Designated Model HWB, the unit features compact construction, systematized controls, and a wide selection of hot-wire probes for industrial and laboratory applications. Accuracy, sensitivity and band width surpass any laboratory or commercial anemometer reported to date, according to the manufacturer.

The compensated amplifier reportedly responds correctly from 2 cps. to 100,000 cps. and has an equivalent input noise level of ½ microvolt. Noise level corresponds to about 1/100th of 1% turbulence level in typical applications, states the company.

Typical uses: jet engine compressor and turbine tests, windtunnel measurements, air conditioning flow studies, examination of ducting velocity profiles, towing tank and water table tests, determination of turbulence intensity and spectra (when used with output meter or wave analyzer).

Flow Corp., 283 Concord Ave., Cambridge, Mass.

Air-Propelled Abrasive Cuts With Precision

Precision cutting, drilling, etching and light deburring of hard brittle materials are accomplished with a new "Airbrasive" unit being introduced by S. S. White Industrial Division of New York.

Manufacturer reports cutting action is performed by fine stream of gas-propelled abrasive particles traveling at extreme speeds and directed at the work through a small orifice nozzle.

A selection of right-angle and straight nozzles with round and rectangular

HAPPY LANDINGS!

On land base strip or pitching flat-top deck . . . wherever any Navy plane comes swooping in to land, there you'll find OSTUCO aircraft tubing. Airplane manufacturers rely on OSTUCO heavy-wall tubing to supply strength-without-weight to such vital parts as axles, shock-absorbers and landing gears. And it consistently meets Army-Navy and AMS specifications. If your aircraft product requires seamless tubing, straight, formed or fabricated, send us your blueprints for prompt quotation. Latest edition of OSTUCO A-2 Handbook is yours upon request.

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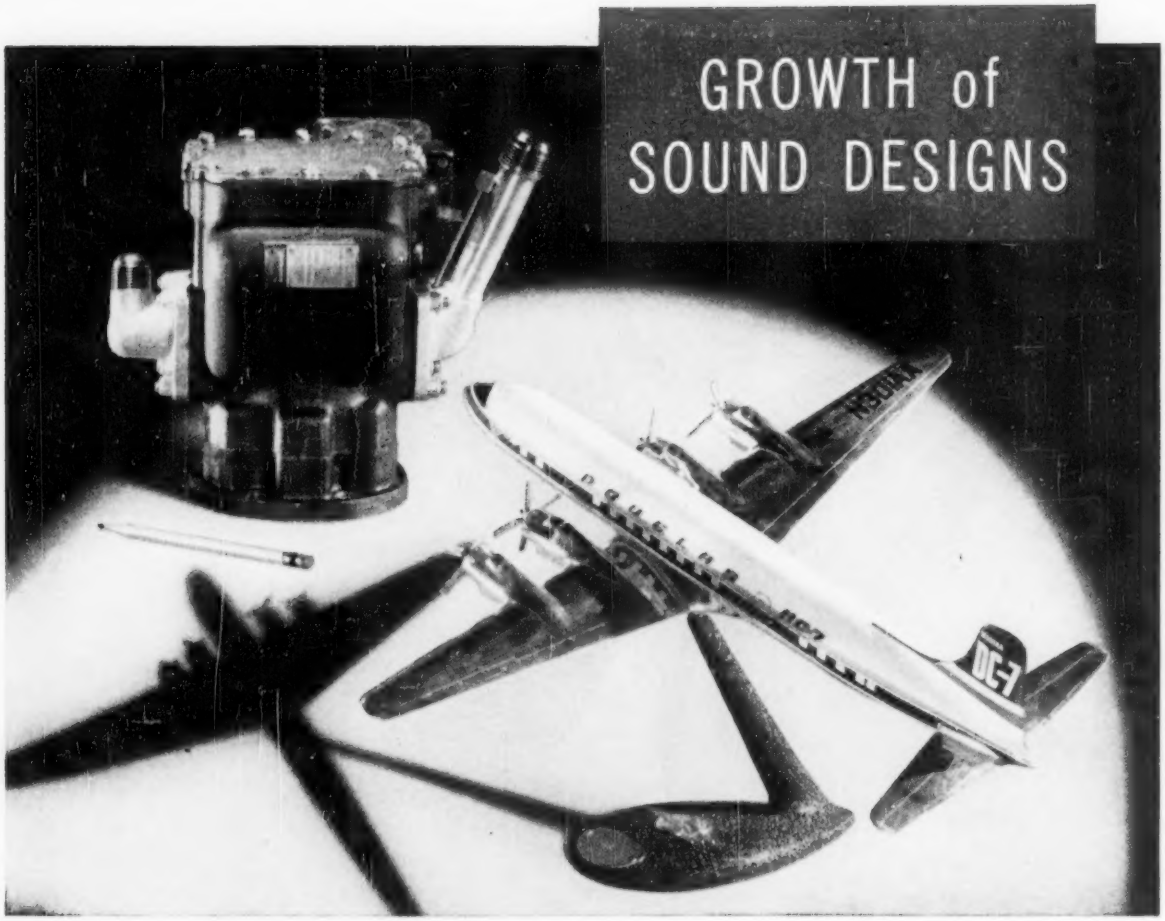

New DOUGLAS DC-7 Uses New VICKERS® Variable Displacement Hydraulic Pumps

Cabin supercharger drives on the new Douglas DC-7 use the largest known variable delivery aircraft hydraulic pump . . . the new Vickers PV-3918. Like the DC-7, the PV-3918 is an outgrowth of previous successful designs.

This pump is a development from similar but smaller pumps used in the DC-6, DC-6A and DC-6B. The basic application was so successful it was adopted for the new DC-7. The new pump provides a 147% increase in flow capacity with only a 50% increase in weight. A special feature of the PV-3918 is an overspeed control which automatically limits the maximum pump delivery and accordingly provides another safety check on compressor impeller speed.

For further information about the numerous advantages of Vickers Variable Displacement Piston Type Pumps, ask for Bulletin A-5203.

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Incorporated
DIVISION OF THE SPERRY CORPORATION
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Application Engineering and Service Offices: El Segundo, Calif., 2160 E. Imperial Highway • Houston 5, Texas, 5717 Kirby Drive
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Additional service facilities at:
Miami Springs, Florida, 641 De Soto Drive

6650

ENGINEERS AND BUILDERS OF OIL HYDRAULIC EQUIPMENT SINCE 1921

orifices is offered for different requirements. With the smallest nozzle, lines as fine as .008 in. can be cut, S. S. White notes.

Chief advantage claimed is that cutting action is accomplished without usual increase in temperature. Also, surface irregularities in material being worked do not affect accuracy of the cut, says the company.

Unit is electrically controlled, operating on 110-v., 60-cycle a.c. current. Propellant gas can be any dry, inert, cylinder type.

For most cutting operations, a nontoxic aluminum oxide powder is used, but company also offers a lighter mixture of magnesium and calcium carbonates.

S. S. White Industrial Division, 10 East 40th St., New York 16.

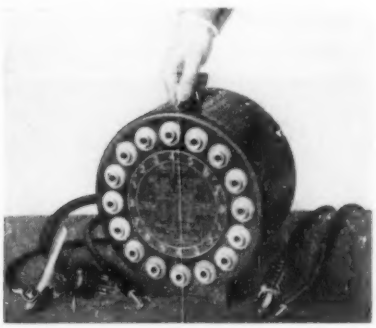
New High-Impact Plastic Speeds Sand Core Output

Production of sand cores for castings is speeded by use of a new high-impact thermosetting plastic. The plastic is used for making sand-core dryers.

After the first dryer has been cast or machined from metal, duplicates are quickly and accurately made from the new plastic in an inexpensive, low-pressure press. One user reports that the plastic dryers retained their original shape and dimensions after more than five hundred 45-min. cycles at 450F.

The plastic, known as Fiberite 4030, forms easily at low temperatures and low pressures, says the manufacturer. Baked sand cores are removed from the dryers with no difficulty. In the forming stage, Fiberite 4030 flows at 320F at 300 psi. Aging and hardening of dryers requires a 6-hr. afterbake at 300F.

Fiberite Corp., Winona, Minn.



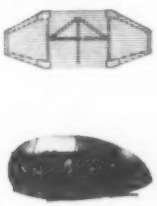
PORTABLE welder does big job.

Very High Output Claimed For Portable Arc Welder

A portable arc welder which weighs only 65 lb. reportedly does the work

© 1954 Lavelle Aircraft Corp.

RADAR REFLECTORS
play a vital part



To find a target or locate survivors takes *accurate*, radar-assisted navigation. The reflectors that send and receive radar's telltale impulses perform a vital function. Parabolic shapes must conform exactly to DESIGN. Top-flight electronics manufacturers know that Lavelle facilities and techniques are unmatched in critical stainless steel and aluminum fabrication of this sort. Experience in this field has earned for Lavelle the reputation of a particularly well qualified and reliable sub-contractor.

Lavelle

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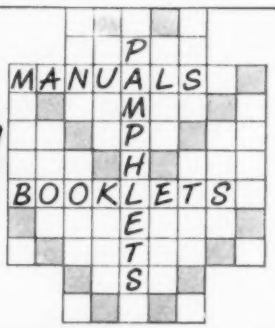

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of a conventional welder four or five times its size. It operates on either 110 or 220 v. a.c., 60 cycles, with a rated output of 200 amp. It actually delivers 250 amp.

The "Bren/Weld" welder incorporates a new "ultra high efficiency" transformer, according to the manufacturer.

It brazes, cuts, preheats and welds steel, up to and including 1¼ in. thick. There are no moving parts requiring adjustment.

Unit handles electrodes from 3/64 in. up to and including 5/32 in., using either metallic or carbon arc process. Housed in a cast aluminum case, dimensions of the unit are approximately 11x 12x7¼ in.

It comes complete with 7½ ft. of welding cables, electrode holder and ground clamps.

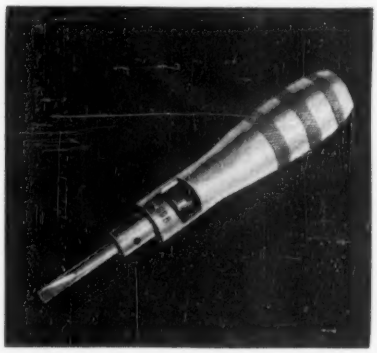
Welder is available from Kasson Die & Motor Corp., 32-14 Northern Blvd., Long Island City, N. Y.

ALSO ON THE MARKET

Test probes, available in a kit of six, simplify voltage measurements across pins or sockets of AN connectors and prevent damage to the connector. Type 580 kit includes three male and three female probes for Sizes 8, 12, and 16 pins and sockets.—Air-O-Tronics, P.O. Box 31, Lancaster, Calif.

Subminiature O rings and other microscopic parts are produced through utilization of the injection molding process in sizes as small as .010 in. cross-section and .020 in. inside diameter.—Minnesota Rubber and Gasket Co., 3630 Wooddale Ave., Minneapolis 16.

Torque screwdriver, which may be preset between 0 and 6-in. lb., holds accuracy within 8-in. oz. Designated Model SD6 Trutorq, unit has patented friction clutch which prevents torque



beyond the preset point from being transmitted to the screwdriver blade. —Airdraulic Engineering Sales Co., Allendale, N. J.

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25 years of P A C experience creates the first maintenance service that lets you predict costs!

POWER BY THE HOUR is a revolutionary approach to lower costs in engine maintenance. You simply pay for the power used and know to the penny what your costs will be at all times.

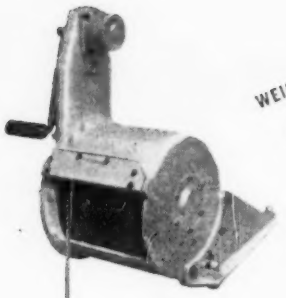
Your engines will be overhauled and fully warranteed in P A C's world-famous Pratt & Whitney Aircraft authorized engine shops. You'll have the advantages of constant modernization, constant surveillance, a complete parts history. You'll have a greater number of hours between engine changes...less out of service time...reduced maintenance costs!

POWER BY THE HOUR is available at both Burbank, Calif. and Linden, N.J. It will pay you to get the full story at once! Phone, wire or write!

Pacific Airmotive Corporation

Other Divisions: Chino and Oakland, California Seattle, Washington and Kansas City, Kansas

2940 N. Hollywood Way, Burbank, Calif.
Linden Airport, Linden, New Jersey



WEIGHS ONLY 47 LBS.

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SAFETY FEATURES

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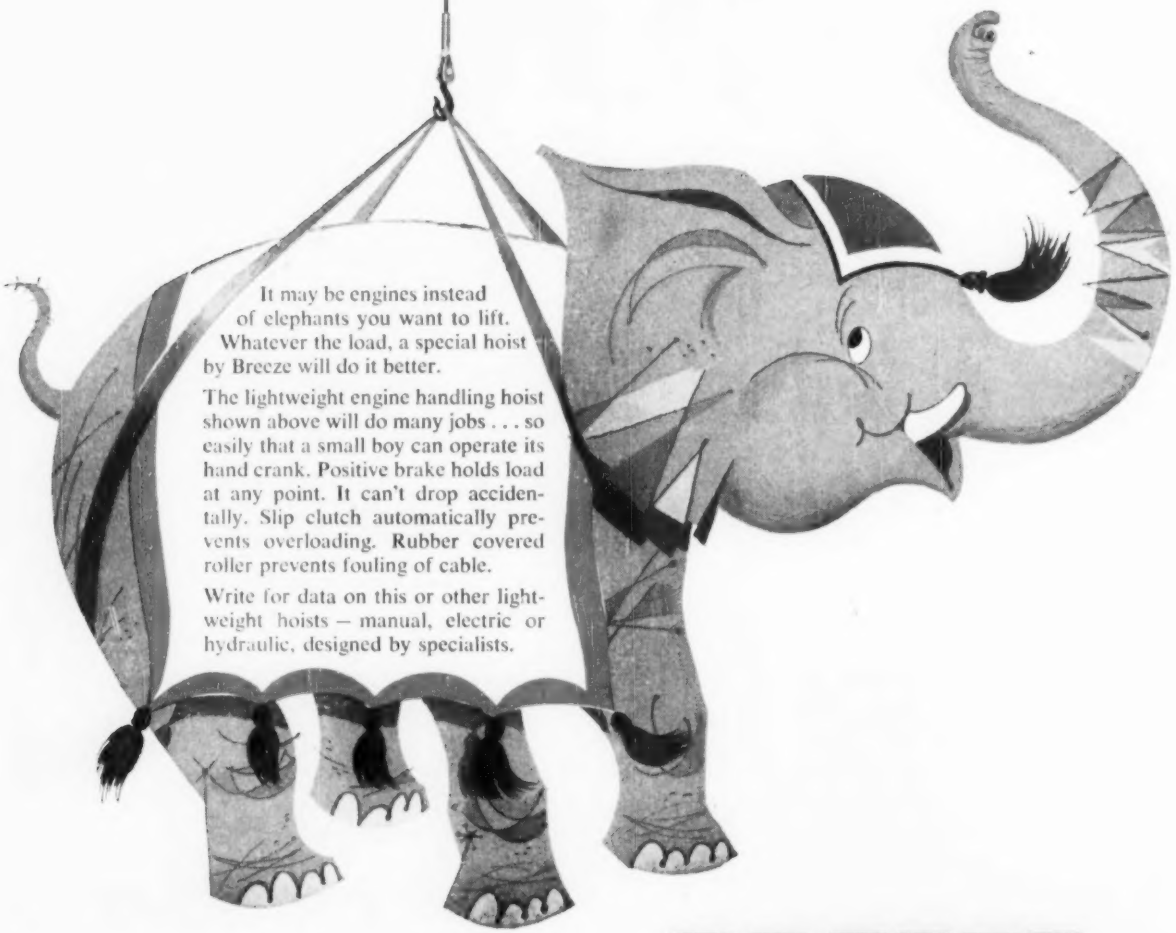
OVERLOAD PROTECTION

HAND HOIST BY BREEZE

LIFTS TONS WITH EASE!



It may be engines instead of elephants you want to lift. Whatever the load, a special hoist by Breeze will do it better.

The lightweight engine handling hoist shown above will do many jobs . . . so easily that a small boy can operate its hand crank. Positive brake holds load at any point. It can't drop accidentally. Slip clutch automatically prevents overloading. Rubber covered roller prevents fouling of cable.

Write for data on this or other lightweight hoists — manual, electric or hydraulic, designed by specialists.

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RADIO IGNITION SHIELDING • FLEXIBLE METAL TUBING • ACTUATING SYSTEMS • WELDED DIAPHRAGM BELLOWS • AERO-SEAL HOSE CLAMPS

BREEZE

CORPORATIONS, INC.

700 Liberty Avenue, Union, N. J.

LETTERS

From a Business Pilot

With reference to the lengthy letter, "Business Plane Design", by A. T. Groves in your May 24 issue, there are some things that should be said . . .

The plane he describes might be suitable for perhaps 100 corporations in the United States, but he seems to forget that there are 10,000 or more companies that need an airplane to fly distances from 100 to 300 miles day in and day out, to be piloted not by professional pilots but by the business owners themselves.

And the reason there are more than 10,000 business owner-pilot prospects is because many are naive enough to be more interested in the convenience and rapid transportation of private airplanes, even at higher rates, than they are in baggage delays and reservation uncertainties plus ticket counter crowding that are prevalent in commercial air transportation today.

For those of us that are flying our company owned airplanes day in and day out, the present airplane manufacturers have done a good job in providing airplanes right now. And the airplanes that they have on the board are going to be decided improvement.

The Beech Bonanza, for example, makes it possible to put in a good day's work 350 miles away but get home in time for dinner with the family.

The new Cessna 310 Twin Transport and Piper Apache are going to improve the utility of business flying.

The day will come, that most business pilots are looking forward to, when we will be able to fly our own 4 to 6 place jet airplanes at speeds up to 300 mph.

The only way that airplanes will be available to both business and private operators at reasonable cost will be through volume large enough to cut production costs. I think that we could safely predict that the $650,000 airplane will never be built in quantities of 5,000 to 10,000. On the other hand, airplanes in the range of $15,000 to $20,000 could be built in substantial quantities and could be sold to the increasing number of business owner pilots.

KEN COOK, President
Ken Cook Co.
AOPA # A102419-Owner Pilot
Bonanza Model C35

Super Dart Pedigree

With reference to the letter from Peter M. Bowers in your May 17 issue concerning my Super Dart airplane, I would like to correct some misconceptions that he holds.

This airplane is not a rebuilt or "reworked" 1926 airplane as he states, but was completely built up from new materials in approximately 2,000 hours of my spare time. It was flown for the first time in August 1953. The general arrangement is obviously based on the Driggs Dart but the ship was entirely redesigned structurally and aerodynamically to meet CAA requirements.

Some of the major differences from the original design are increased span and wing area, modified wing platform, NACA 4400 series airfoil instead of USA 45, shorter tail arm, increased tail area, redesigned cabin structures, Wittman type landing gear, and 55-hp. Lycoming engine installation. This ship was built for my own use purely as a hobby.

It is surprising that Mr. Bowers can speak so authoritatively about my airplane when so far as I know he has never been within 2,500 miles of it.

JACK MCRAE
Box 108
Hempstead, N. Y.

Slow Production

In your Apr. 12, 1954 issue of AVIATION WEEK in the article on "Air Force Develops New Production Plan," you show a chart of the delivery schedule of new aircraft. You show the imaginary aircraft Nos. 54-0022 and 54-0023 (Climatic and Icing Tests) assigned to Phase III. They should be shown under Phase V.

The Wright Air Development Center is charged with conduct of the Phase V portion of the test program. This includes the following tests and aircraft:

Climatic Tests	54-0022
Icing Tests	54-0028
Operational Evaluation	54-0025
(All-Weather)	54-0033

HUGH B. MANSON, JR., Colonel, USAF
Director of Flight and All Weather Testing
Wright Air Development Center
Wright-Patterson Air Force Base
Ohio

(The chart accompanying the article on the USAF slow initial production plan was furnished to us by ARDC Headquarters. —Ed.)

Private Enterprise

Thank you for your note of May 20 to which was attached the editorial page of the May 24 issue of AVIATION WEEK. Of course, I was very much pleased with your editorial on the contribution which we are making through the 707. Although we had a minor taxiing accident with the airplane, no substantial damage occurred and we expect to have it back in flight status within a few weeks. From the tests to date, there is every indication that we have a fine airplane.

We feel that the 707 will make a major contribution both in the military and commercial fields. We are proud that we have been able to bring out this airplane on our own, and view it as an example of private enterprise at its best.

Many thanks for the recognition which you have given to our effort.

WILLIAM M. ALLEN, President
Boeing Airplane Co.
Post Office Box 3107
Seattle 14, Wash.

Mr. Allen has already written to thank you for your recent editorial called "Boeing's Achievement," but I want to add my appreciation. Not only was the recognition appreciated, but your discussion of the

Grumman

ENGINEERS
needed to
work on new
"Grumman Cat"

Grumman, nearing its 25th Anniversary, needs engineers to work on its new experimental light-weight Naval fighter, plus other jet fighters, anti-sub planes, and amphibians. Grumman has openings for experienced aircraft engineers, and recent engineering graduates.

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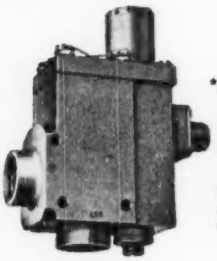
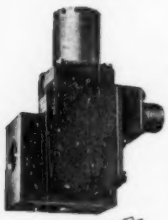
PRODUCED TO RIGID AIRCRAFT STANDARDS

26038 WITH INTEGRAL RELIEF.
NORMALLY CLOSED.
¼" and ⅜" LINE SIZES.
Operating pressure: 350 psi;
Relieves inlet to outlet within 500 to 700 psi range.
Weight: 0.60 lb.
(Also available in 1500 and 3000 psi capacities.)



*25853 PILOT OPERATED.
NORMALLY CLOSED.
¾" and ½" LINE SIZES.
Operating pressure: 3000 psi.
Weight: 1.45 lb.
(Also available with manual override or normally open.)



*26610 PILOT OPERATED.
NORMALLY OPEN.
¼" and ⅜" LINE SIZES.
Operating pressure: 3000 psi.
Weight: 0.81 lb.
(Also available normally closed.)

*High Flow Capacity Valve with filtered pilot circuit.

FLUID: Specs. MIL-0-5606 or MIL-F-7083.
ELECTRICAL RANGE: 18-30 VDC.
SOLENOID DUTY: Continuous.
CURRENT DRAIN: 0.5 Amp at 24 VDC.
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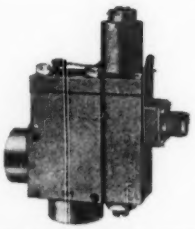

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subject of costs and profits was very helpful. As you know, this is a subject that is difficult to get generally understood, but one that we think is rather important to the long-range health of our industry and therefore our national defense.

Thanks, too, for the various news and feature articles that appeared in the same issue on the subject of the jet Stratoliner prototype. Please pass our thanks along also to Bob Hotz.

There is great enthusiasm here for the new transport. We are all looking forward to seeing it in the air.

HAROLD MANSFIELD,
Director of Public Relations
Boeing Airplane Co.
Post Office Box 3107
Seattle 14, Wash.

I have just seen the current issue of your well-known publication and want to express our appreciation of your very fair and objective handling on our taxi mishap. . .

CARL M. CLEVELAND, Manager
Public Relations & Advertising
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Post Office Box 3107
Seattle 14, Wash.

Engineering Forum

In your May 17th edition of AVIATION WEEK I was again reminded of a possible blank spot in the public's memory.

I see the article in the box entitled "Engineering Forum" wherein Leonard S. Hobbs speaks on jet engine history. No one seems to mention the barrel-shaped Italian ship which is still to be seen at the airport adjacent to Milan. Didn't this ship fly even before the German Heinkel, which is called by Mr. Hobbs the first flight? Frankly, I don't remember; but I would be interested in what your research turns up.

ALFRED L. WOLF
Packard Building
Philadelphia 2, Pa.

(Caproni-Campini CC2 flew in August 1940, one year after the Heinkel flight. Even so, it was a somewhat different engine system; although the final output was jet thrust.—ED.)

Praise

In reading your Apr. 26 editorial, I thought you might like to know some of the **other** reasons AVIATION WEEK rates tops in my household:

First, it keeps me broadly informed on all aviation matters. You know why—you make it that way.

Second, thanks to your unique editorial policy and Phil Klass, I very frequently am better informed, sooner, on electronics matters from your Avionics section than by several electronics industry publications; and electronics is my business. On several recent occasions, I have circulated AVIATION WEEK's articles among our top executives.

Third, we have a five-year-old son who is as completely "gone" on airplanes as his old man. He preferes AVIATION WEEK to all other flying magazines—especially including those written for kids.

"Out of the mouths of babes"—indeed!

ROBERT BLODGET
75 Templar Way
Summit, N. J.

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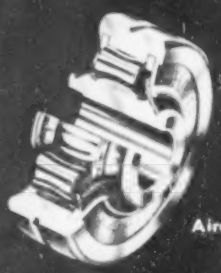

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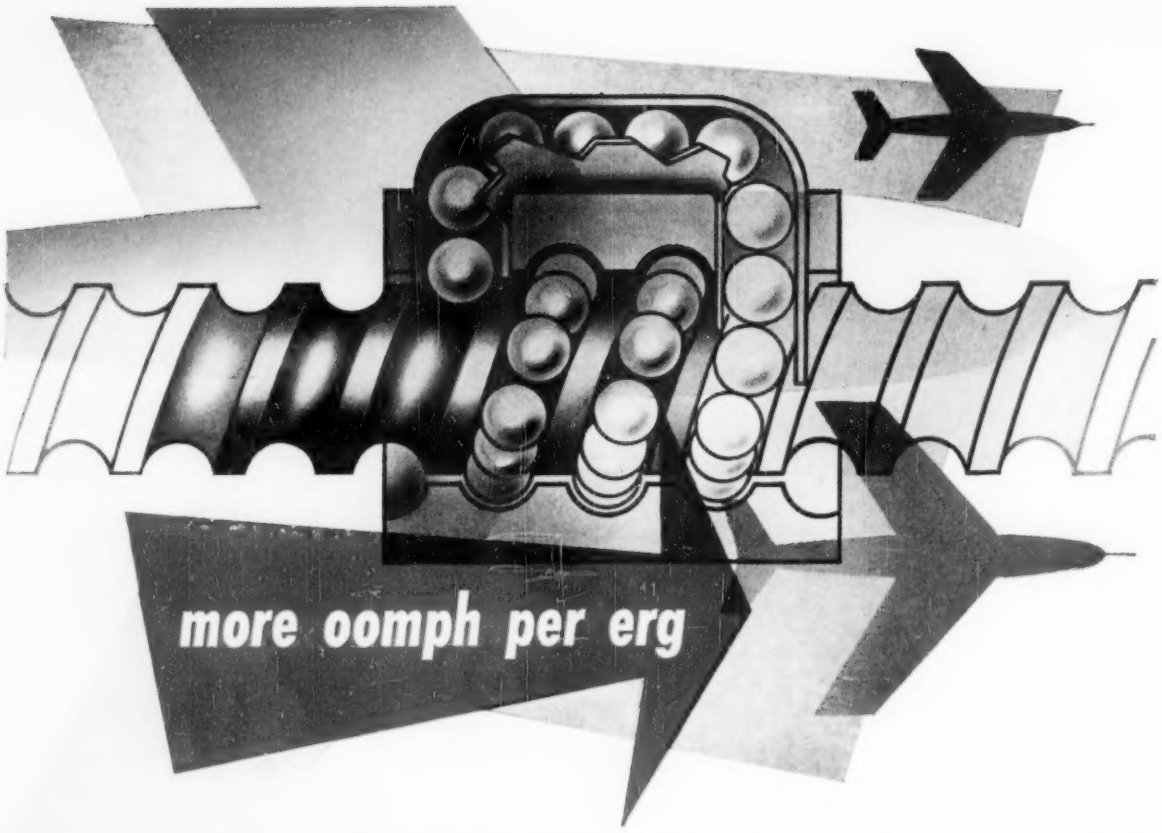

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Braniff Weighs $5-Million Panagra Offer

- **Merger of Latin American operations would speed decision in the long-delayed Balboa service case.**
- **Quick CAB approval is expected in light of strong Presidential policy favoring such consolidations.**

By Frank Shea, Jr.

Pan American-Grace Airways, furnishing what could be the key to solution of the perennial Balboa through-service case, has offered to purchase physical assets of Braniff Airways' international operations in exchange for $5 million in stock of Pan American World Airways and W. R. Grace & Co., or for cash.

Braniff's board of directors had the proposal under consideration last week, and indications were that the majority looked upon it favorably.

General industry feeling is that the offer, if accepted and approved by Civil Aeronautics Board and the President would solve what had appeared to be an impossible situation.

► **Sharp Slaps**—Panagra's move stems directly from a CAB proposal that recommended some form of merger between Panagra's routes and those of Braniff in Latin America to culminate in establishment of a single independent airline (AVIATION WEEK Apr. 5, p. 88).

The recommendation was considered a sharp slap at Pan American and Grace, since it left no doubt that CAB already had assumed their guilt in the government anti-trust suit that seeks to divest both companies of control of Panagra. The Board listed the anti-trust suit as one of the motivating factors for its recommendation, and therefore called for an "independent" airline.

CAB came in for sharp criticism as a result of this "guilty before proven" policy, with several airline officials calling the recommendation "the most ridiculous move made by the Board in recent years."

► **Sound Proposition**—On the basis of this attitude toward PAA and Grace, observers believe the Board will be anything but enthusiastic over the Panagra proposal, because it would benefit the airline's co-owners.

But, it is pointed out, Panagra's purchase of Braniff's South American operations would seem to benefit all concerned. Further, such a move is considered to be in direct line with the Administration's thinking—as evidenced in the recently released Civil Air Policy Review prepared by the Air Coordinating Committee and approved by President Eisenhower (AVIATION WEEK May 3, p. 12).

The Administration policy specifically calls for reduction in subsidy burdens to the taxpayers, and the merger of uneconomical operations with those of stronger airlines. Since Braniff's international service has been a losing operation since its inception, at heavy expense to the taxpayer, general feeling is that the purchase by Panagra would be a sound proposition.

Prior to release of the President's policy report, Panagra's proposal probably would not have stood much chance with the Board. But now, observers say, CAB probably will have to go along with it, because it is basically in accord with announced Administration policy.

It also has been pointed out that, with several of its members up for reappointment in the near future, the Board is not likely to oppose the Administration at this time.

► **'Fair' Offer**—A Panagra spokesman says his company considers the offer to be "eminently fair and desirable" from the standpoint of Braniff's stockholders. He adds that, if carried out, the purchase would reduce the amount of subsidy now being paid to sustain U. S. flag airline operations in that area against foreign competition and is "definitely in the public interest as well as Braniff's stockholders."

The Braniff assets that would be taken over by Panagra consist of aircraft and ground facilities used in international service, valued at approximately $5 million.

► **Cash or Stock**—Panagra says Braniff would receive approximately 217,000 shares of PAA stock and 73,500 shares of Grace stock, or cash in lieu of stock to the extent that Braniff might elect. Pan American would purchase from Panagra about one-half of the Braniff assets for cash.

Should the PAA and Grace stock be distributed to Braniff holders, each owner of 35 shares of BNF stock (with a present market value of approximately $280) would receive two shares of Grace stock and six of PAA (carrying a total market value of about $139) and still retain his interest in some seven-eighths of Braniff's investment.

Panagra says that from an overall company standpoint, as against a present aggregate market valuation of approximately $10 million for all its assets, Braniff would be receiving $5 million in marketable securities for about one-eighth of its assets.

The airline also points out that the 1953 earnings of Pan American and Grace stock, equivalent to 52 cents for each Braniff share outstanding, exceeded the aggregate earnings for Braniff for three of the last five years.

The corresponding dividends are equivalent to 21 cents per share of Braniff stock and compare with no BNF dividend in 1949, 25 cents in 1950, 50 cents in 1951 and no dividend for either 1952 or 1953.

► **Low Subsidy**—In making its offer to Braniff, Panagra placed particular emphasis on the Administration's new civil air policy, citing the section that calls for "keeping international subsidy requirements as low as possible through development of the most economic route pattern and the avoidance or elimination, where it now exists, of uneconomic competition between U. S.-flag services."

► **Balboa Prod**—Should Braniff accept the Panagra offer and if CAB and presidential approval follow, the Balboa through-service case should be well on its way to a decision after more than three years of hearings and oral argument.

General feeling is that the long-sought interchange agreements between PAA, Panagra and Eastern Air Lines, involving provision of one-plane service between New York and Balboa, C. Z., also might be granted. This, too, would be in accord with the Administration's civil air policy.

Panagra DC-7s

Panagra has concluded an $8-million credit with six New York banks to finance the purchase of its five Douglas DC-7Bs, on order since last September (Aviation Week Sept. 28, p. 16).

The aircraft are scheduled to be placed in operation in mid-1955 on the airline's El Inter Americano service via the west coast of South America to Buenos Aires.

Panagra estimates the DC-7s will cut more than two hours from New York-Buenos Aires DC-6 time.

Outside Services Cost Airlines $2 Million

Subsidized airlines spent more than $2 million on legal, accounting, advertising and other outside services during 1953, according to a report made by Civil Aeronautics Board at the request of Senate Appropriations Committee.

Half of the total, $1,029,674, was spent by two carriers: Trans World Airlines, $564,320; Pan American World Airways, $465,354. TWA's major payment was $304,000 to the law firm of Chadbourne, Parks, Whiteside, Wolff & Brophy. PAA's major payment was $201,350 to the accounting firm of Loomis, Suffern & Fernald.

Only persons or firms receiving more than $10,000 during the year were reported.

Here is a breakdown of the report, listing the airline, the company or person performing the service and compensations totaling $2,095,701:

Alaska Airlines, Pogue & Neal, legal, $23,684; Colin Hugh McIntosh, consultant, $12,487; Allen, Hilen, Froude, Degarmo & Leedy, legal, $18,496; McCutcheon, Nesbitt, & Rader, legal, $10,000; Peaslee, Bregham, Albrecht, & McMahon, legal, $15,000.

Allegheny Airlines, Hale, Stimson, Russell, Nickerson, legal counsel, $24,000.

Braniff Airways, Whitford, Hart, Carmody & Wilson, Washington counsel, $60,000.

Central Airlines, Pogue & Neal, legal, $21,071.

Colonial Airlines, Kimball & Gill, professional fees, $11,900; Sullivan, Donovan, Heenehan & Hanrahan, legal, $25,000; Arthur Young & Co., audit fees, $10,200.

Continental Air Lines, E. Edward Leasure, legal, $15,500; Holland & Hart, legal, $12,000; Harold Judson, commission on sale of aircraft, $118,890.

Delta-C&S Air Lines, Pogue & Neal, legal, $55,697; Powell, Goldstein, Frazer & Murphy, legal $10,546; Lazo Y. Cubas, legal, $12,721; Arthur Andersen & Co., auditing, $35,071.

Frontier Airlines, Arthur G. Rippey, advertising agency, $129,263.

Lake Central Airlines, Albert F. Grisard, legal, $10,397.

New York Airways, Skadden, Arps & Slate, legal, $35,700.

North Central Airlines, Wheeler & Scoutt, legal, $19,775.

Northeast Airlines, Foley, Hoag, & Eliot, general counsel, $32,000; Lybrand, Ross Bros., & Montgomery, auditors, $20,245.

Northern Consolidated Air Lines, Theodore I. Seamon, attorney, $15,544.

Northwest Airlines, (Northwest Orient Airlines) Henry Beecken & Associates, services on CAB cases, $35,276; Ernst & Ernst, accounting, $50,848; C. Edward Leasure, legal, $35,750; Hodges, Reavis, McGrath, Pantaleoni & Downey, legal & financial, $30,000; White & Case, legal, $21,450.

Pan American Grace Airways, Arnold, Fortas & Porter, legal, $25,000; Covington & Burling, legal, $13,200; Price Waterhouse & Co., accounting, $19,800.

Pan American World Airways, Lowell A. Mayberry, consultant, $39,000; Root, Ballantine, Harlan, Bushby & Palmer, legal, $15,000; Julius Klein, public relations, $16,400; Loomis, Suffern & Fernald, accounting, $201,350; Cleary, Gottlieb, Friendly & Hamilton, legal, $66,282; Columbia Reporting Co., official reporters, $11,794; Paul Aiken, airmail traffic consultant, $12,000; Steptoe & Johnson, legal, $18,000; J. Walter Thompson, advertising, $55,528; Dickie-Raymond, Inc., advertising, $18,000; Liberia Co., engineering consultants & technical assistance, $12,000.

Piedmont Aviation, Inc., Kilpatrick, Ballard & Beasley, legal, $10,395.

Pioneer Air Lines, Chapman, Bryson, Walsh & O'Connell, legal, $18,000.

Trans-Texas Airways, Clark, Coon, Holt & Fisher, legal, $28,400.

Trans World Airlines, Chadbourne, Parke, Whiteside, Wolff & Brophy, legal, $304,000; Haskins & Sells, auditing, $28,172; Reed, Smith, Shaw & McClay, legal $20,000; Airport Medical Center, medical, $17,488; Batten, Barton, Durstine & Osborn, Inc., advertising, $37,218; Universal Advertising Agency, advertising, $28,283; Carl Byoir & Associates, Inc., publicity, $14,507; Gramercy Park Press, Inc., publicity, $31,249; Douglas Williams Associates, personnel relations, $10,558; Amman & Whitney, engineering, $26,662; Garth A. Sharp & Tom Ward, Jr., flight training, $46,183.

Wien Alaska Airlines, T. I. Seamon, attorney & company representative, $12,811.

Mohawk Starts Copter Air Express

Mohawk Airlines inaugurated the first scheduled air express shipments by helicopter in the East June 7 with service from Newark Airport, N. J., to Liberty-Monticello, N. Y., twice daily. Additional weekend flights are scheduled. Here Robert E. Peach (right) receives an air express shipment from Frank J. Fagan, of Railway Express.

Trunkline Wins Voice On Feeder's Renewal

Civil Aeronautics Board has approved United Air Lines' application to participate in Southwest Airways Co.'s certificate renewal case, the first move by CAB to carry out the Administration's policy on local service carriers (AVIATION WEEK May 3, p. 12).

United's application requested amendment of its certificate for Route 1 to include on a temporary basis such points now served by Southwest on Route 76 that require continued air service. Southwest Airways opposed United's motion for consolidation on grounds that UAL's application was not filed at the proper time.

▶**Policy Review**—The CAB order states: "Irrespective of the application filed by United, the Board has recently reviewed its policy with respect to local service carriers and, as a result, is of the view that in proceedings for the renewal of local service certificates it should consider whether, in those instances where the Board may find that continuation of the operating authority of the local service carrier is no longer required by the public convenience and necessity, continuation of portions of such service may nevertheless be clearly required to meet the public interest and can be provided by a trunkline carrier without cost or at substantially reduced cost to the government.

"To this end, appropriate applications by the trunkline carriers should be consolidated with the renewal proceedings and, in appropriate cases, the Board may institute proceedings . . . to determine whether service to a particular point or points by a trunkline carrier is required by the public convenience and necessity.

"Although such a procedure would be applicable primarily to renewal proceedings hereafter instituted, it should also be followed where no major or prejudicial relay in the processing of pending renewal proceedings will occur."

CAB granted other trunklines 10 days from the date of order in which to submit applications for consolidation in the Southwest renewal case.

▶**Dissent Views**—CAB Democratic members Josh Lee and Joseph Adams dissented in the three-two decision. Lee's dissent states:

"Undoubtedly this is the first step toward implementing the announced

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You'll enjoy an excellent profit sharing and pension plan with a company that has one of the lowest engineering turnover rates in the industry. And you'll be working for a successful, production-wise, financially stable company that's young and growing. That's a rare combination. And it offers you a rare opportunity.

Immediate openings We have interesting jobs open now for many types of engineers, especially Aerodynamicists with a background in Stability and Control and in High Speed Performance.

If you think you'd like TEMCO as well as we who work here now do, sit down and write a letter today to:

E. J. Horton, Jr.,
Engineering Personnel Supervisor

TEMCO
AIRCRAFT CORPORATION
DALLAS, TEXAS

Air Coordinating Committee policy of eliminating the local service carriers.

"Since Southwest is one of our best local service carriers, it would seem that the majority would wish to follow that portion of the ACC policy study which would look toward the improvement of Southwest's economic position so that it can continue to show progress toward self-sufficiency. . . .

"This evidently means that from now on, as each local airline certificate renewal case comes up, the majority may be expected to inject into the renewal proceeding this issue of eliminating the local service experiment. Local service carriers in addition to Southwest who may be faced with this action in the immediate future are West Coast, Trans-Texas, Lake Central and Pioneer."

▶ **'Significant'**—Lee claims the "majority concedes United has not shown good cause for waiver of the Board's rules of practice on timely filing.

"It is, therefore, significant that United's application has been put into the Southwest renewal case by the majority on its own initiative."

The majority order states: "Needless to say, the Board's action in broadening the scope of the issues does not constitute in any degree a tentative or preliminary determination that the certificate of Southwest will not be renewed or that any point or points on Southwest's present route will be transferred to a trunkline carrier."

Dayton Taxes Airlines 20 Cents Per Fare

In an attempt to make a profit at Dayton's Municipal Airport, Dayton city commissioners have approved a plan to assess airline passengers and fares that are carried by airport taxicabs.

They gave City Manager Herbert W. Starick authority to negotiate with the airlines to collect 20 cents on every passenger brought into the city. Passengers in cabs using the airport would be charged 25 cents, according to the proposal.

By these assessments, it is hoped to make a net profit of about $38,000 on the airport for 1954. Operating costs for the year will be approximately $308,000.

NWA Super Connies

Northwest Orient Airlines will put four of the six Super Constellations on order from Lockheed Aircraft Corp. into operation next spring on northern trans-Pacific routes.

The U.S. carrier has sold the other two Super Connies to Qantas Empire Airways.

Effect of Higher DC-6A Load

The effect of a 5% increase in maximum zero fuel and landing weights of the DC-6A:

Aircraft productivity	Present weights	5% increase
Maximum payload	30,000 lb.	34,160 lb.
Maximum range for maximum payload	2,200 mi.	1,700 mi.
Average system block speed	250 mph.	245 mph.
Miles per year	775,000	775,000
Direct operating costs	**Present**	**5% Increase**
Cost per mile	$1.00	$1.10*
Cost per year	$775,000	$853,000

* Direct cost per mile increased by 10% to cover effect of 2% decrease in block speeds, possible need for higher grade fuel over certain trip lengths, possible increase in maintenance expense per flight hour, etc.

Source: Douglas Aircraft Co.

Tigers Ask DC-6A Payload Boost

Airfreight line says transport can operate safely with 14% more cargo, seeks year's test to prove it.

A one-year exemption from Civil Air Regulations that will permit a 14% increase in payload on the Douglas DC-6A cargo transport is being sought from Civil Aeronautics Board by the Flying Tiger Line, Inc.

The application, on which CAB's Bureau of Safety Regulation made recommendations to the Board last week, asks for authorization to operate the aircraft "with an increase in the maximum landing weights and the maximum zero fuel and oil weights to 105% of the maximum certificated weights permitted per passenger aircraft."

▶ **Profit Increase**—According to figures compiled by Douglas Aircraft Co., the proposal would increase available payload from 30,000 to 34,160 lb.

If the aircraft is flown a typical 775,000 mi. a year with an 80% load factor, it is estimated that it will increase the annual operating profit for each plane by $31,800. If the plane has a 10-year useful life, the additional profit will recoup 30% of its original cost.

Flying Tigers owns five DC-6As, of which four have been leased to Northwest Orient Airlines. The company has two more on order and will acquire an additional two when the merger with Slick Airways is completed.

Only other operators of the cargo version of the DC-6 are Pan American World Airways and American Airlines.

▶ **One-Year Test**—In the application, filed with the Board May 7, Flying Tigers gave six reasons why the exemption should be granted:

- Engineering soundness of the idea can be shown during a one-year trial.
- The economic advantage is important "in the creation of a profitable, subsidy-free industry."
- No increase in maximum takeoff weight is requested.
- No change is requested in requirements for performance and landing distances.
- Douglas will supervise periodic inspections of the aircraft structure under any program ordered by CAB. The Board will get a report on these inspections before the exemption period ends with a request for continued increased weights as justified by the results.
- Douglas says a trial period of one year is advisable and that "any effect on the safety of flight is minimal."

A supporting letter from Douglas, signed by vice president-engineering A. E. Raymond, says that one-year trial requested by Flying Tigers is the "only practical method of permitting some relaxation from the rules that were established for commercial passenger planes."

In another study submitted to the Bureau of Safety Regulation, Raymond says the proposed 5% increase in maximum zero fuel and loading weights would mean the limit load factor for which the DC-6A was designed would be cut from 2.5 to 2.4. His calculations show that, operating with increased weight, it will be necessary to reduce CAA's required rate of descent from 10 ft. per sec. to 9.25 ft per sec. in order to maintain proper load on the landing gear.

The Air Line Pilots Assn. has filed a request to intervene in the case.

Senators to Study Nonsked's Role

Committee asks details of North American Airlines' operation as Gurney, Murray clash on McCarran Bill.

The role of North American Airlines in the air transportation network, now under consideration by Civil Aeronautics Board, will be reviewed by the Senate Interstate and Foreign Commerce Committee before Congress adjourns.

The move to study the large nonsked was made by Sen. Andrew Schoeppel. Pointing to a chart of North American's complicated corporate organization, Schoeppel declared that he could "not see how the Board would be in any other position than a lot of administrative difficulty" in endeavoring to enforce rules and regulations on the airlines.

The chart was presented to the committee by Air Transport Assn. (AVIATION WEEK Apr. 26, p. 80).

▶**'Plum' Points**—The Kansas Republican then announced two actions:

• He requested CAB to submit to the committee the complete background on the North American case and data apparently aimed to show that scheduled airlines are offering coach service to all the "plum" points served by North American, as well as to uneconomic points.

Specifically, Schoeppel requested: a "detailed study" of nonsked operations from their start to the present; the number of cities receiving coach service by scheduled airlines; the number of cities served by North American's competitors—American Airlines, Eastern Air Lines, National Airlines, Trans World Airlines, and United Air Lines; the number of cities receiving coach service from each of these competitors; the number of cities served by the five major airlines that are uneconomical points.

He also asked for details on the 1953 operations of North American and each of the domestic trunk carriers showing the number of cities served, the passenger and revenue miles flown, and the average length of haul of each.

• Schoeppel said he would ask Board enforcement officials to appear before the committee to answer "a series of questions . . . because we have had complaints . . . about the CAB not enforcing the laws more effectively."

▶**Gurney vs. Murray**—Schoeppel's requests were made during testimony by CAB chairman Chan Gurney on the omnibus McCarran Bill rewriting civil aviation law.

He differed with Administration testimony by Commerce Undersecretary for Transportation Robert Murray on:

• **New types of service.** Gurney supported provisions of the McCarran Bill liberalizing the authority of the Board to issue certificates for new types of services but said it did not go far enough in this direction. Murray took the position that the Board's present authority is adequate.

The McCarran Bill would authorize the issuance of three-year certificates for "experimental" services without a showing of "public convenience and necessity." The Undersecretary said this is unsound. But Gurney declared that this approach is "essentially sound."

The McCarran Bill would ban experimental certificates that duplicate existing routes. This, Gurney maintained, would defeat the objective. He pointed out that new types of service, such as all-freight operations or all-expense tours, might duplicate the service of existing carriers and yet be new experimental services.

"Since the basic authorization to the certificated carriers is an extremely broad one, permitting the carrier to perform air transportation services of all types over its routes, the development of a wholly new type of service would be nullified by this provision," the CAB chairman testified.

• **Regulation of securities.** Gurney strongly urged that the Board be given authority over the issuance of airline securities. Murray vigorously opposed this, stating: "If the government takes on the final authority for determining the wisdom of a particular financing program, it must by the same token assume some responsibility for any subsequent problems developing from such a program, including a responsibility to alleviate such problems through subsidy."

On the contrary, Gurney declared, "air carriers, in part at least, have a need for subsidy from the federal government, and it is only elementary wisdom that the issuance of securities should be subject to approval of the Board in order to insure that unwise investment and security dealings will not destroy that which the government through subsidy has built up."

He said his testimony represented the unanimous views of CAB with one exception: Board member Joseph Adams differed with the endorsement of economic regulation of air contractors. Adams is scheduled to testify later before the committee.

Gurney particularly emphasized that CAB should be given authority to set minimum rates for air contractors on Defense Department business.

"The competition for this traffic is fairly stringent," he said. "Hence, these carriers may tend to cut their charges for transportation service to the very minimum. The situation is such as to give rise to reasonable fear . . . that unless the minimum rates . . . are regulated and fixed by the Board, the safety of their operations will be jeopardized.."

▶**Basis of Need**—Other points made by the Board chairman:

• Air carriers no longer should be eligible for government subsidy on a basis of "need," as under the 1938 Civil Aeronautics Act. He urged legislation authorizing the Board to prescribe, in certificates of public convenience and necessity, "the total subsidy payable in any one year—even if such amount were insufficient to satisfy the entire need."

Once an airline has passed through the developmental stage and has reached economic self-sufficiency, Gurney said, "it should cease to be eligible for subsidy even though it might again return to the 'need' class."

• A new category of "supplemental air carriers" should be established with "limited" certificates specifying the service these airlines would be authorized to perform.

"If the field of scheduled trunkline service appears to be limited," Gurney said, "the field of supplemental service does not appear to be." He objected to the McCarran Bill's approach, establishing a category of "irregular air carriers" and requiring that they be certificated. This still would leave the Board with "one of the greatest problems—enforcing irregularity provisions," he said.

"What is necessary . . . is the ability to impose any type of limitation or condition so as to tailor the authorization to a proved need. It should thus be possible to limit frequency of schedules, to prescribe the type of equipment to be used as well as the points to be

Airliners vs. Bikes

Civil Aeronautics Board chairman Chan Gurney told senators on the Commerce Committee that he found it difficult to comprehend what .52 fatalities in 100 million passenger-miles, the scheduled airlines' 1952 safety record, means.

But Gurney explained: "I am impressed when I learn that I, as an average passenger, could ride approximately 120 years, 24 hours a day, on U.S. scheduled airlines both within the U.S. and abroad before my number would be up.

"I am dismayed when I learn that more than 10 times as many persons were killed in the U.S. in 1952 on bicycles than on the scheduled airlines—dismayed to think of what a relatively dangerous instrumentality the bicycle is."

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served and the specific type of service to be offered."

• There should be no "wholesale" rewrite of civil aviation law, as proposed by the McCarran Bill. The 1938 Act should stand, and whatever amendments are considered desirable should be made.

• There is no need for creation of an independent air safety board to separate the safety investigative and safety rule-making functions.

"There is no conflict of interest between true accident investigation and safety rule-making responsibilities," Gurney declared. "A truly impartial investigation does not seek to deal with 'blame' but rather to determine how the accident occurred, in order to prevent future accidents."

The airlines' safety record, he said, "certainly does not demonstrate any need for changing the present safety investigation setup." In 1952, he reported, deaths per 100 million passenger-miles of .52 on the scheduled airlines compared with 3.9 in automobiles and taxis, 1.0 on buses, and 3.4 on railroad passenger trains.

The Board took no position on the McCarran proposal to merge Civil Aeronautics Administration and CAB into a seven-member civil aeronautics authority, Gurney said, because of the personal interest of the members in such a change.

ATA Maps Program For New Airline Gains

The airline industry is making a strong effort to increase longhaul passenger traffic and wants new equipment to make a bid for the shorthaul market, says Stanley Gewirtz, assistant to the president of Air Transport Assn.

"We're not satisfied with 71 out of every 100 passengers traveling over 1,000 miles," he told an ATA dinner for Aviation Writers Assn.'s convention in Miami Beach, Fla. "We're going to try to get all of them on first-class or coach.

"Why else would we put coach service into close to 100 cities domestically and over 85 foreign and overseas points?"

Of the shorthaul market, Gewirtz says airlines carried only 9 million of the 475 million passengers who traveled less than 250 miles in 1953. Given the right equipment, he adds, "we can move into that market."

▶ **Positive Steps**—The ATA official says the air transportation industry also intends to:

• Find new markets.

• Survey the public to determine why, where, when and how people travel and what can be done to change their travel habits and attract their business.

• Explore the airfreight potential more

fully, with the prospects of new cargo equipment.

▶ **Problems**—Gewirtz says the program to increase airline business is being taken to meet climbing expenses that have kept traffic booms from being reflected in higher net incomes for the carriers.

In 1954, he forecasts, it will cost the airlines 96 cents for every dollar's worth of traffic produced.

Gewirtz says the air carriers also must find a way to overcome these other problems:

- Fluctuations and basic instability of the traffic market since World War II, despite enormous upward trends, have prevented the industry from accumulating necessary reserves.
- It is estimated that a 1% drop in load factor during 1954 will decrease net operating income by more than $12 million.
- In 1954, the industry probably will pay $1.92 for goods that sold for $1 in 1938; salaries have increased from an average index base of 100 in 1938 to 231 in 1954.

▶ **Partisan Complexion**—Gewirtz charges that the government appraisal of commercial aviation's problems "is beginning to take on a political complexion."

He says this is essentially dangerous because it strikes at the concept of regulatory administration.

"The administrative process is . . . a non-partisan approach to problems which require specialized talents and particular facility," he says. "Its reason for being and its success derive from the essential desire to remove the fashioning of industrial policy from political influence."

▶ **Nonsked Abuse**—The ATA executive describes the Air Coordinating Committee's Aviation Policy Report as good on the whole.

But, he says, "No part of the ACC report will suffer greater abuse than the committee's recognition of the anomaly of the nonscheduled airlines' unregulated and dislocating usurpation of the rich transcontinental and north-south routes.

"The nonsked problem is just one of many lying ahead for the industry. It merely emphasizes the nature of air transport development, to a greater extent, along the traditional arteries of the nation and underscores the problem of necessary and continuing support of marginal and unprofitable cities by rich traffic-producing metropolitan areas.

"The extent of the need to maintain regulation to straighten out this balance and the need for government understanding of this problem is evident from the fact, that, in 1953, despite regular service by all domestic airlines to 580 cities, 25 top airports produced 68% of all the passengers."

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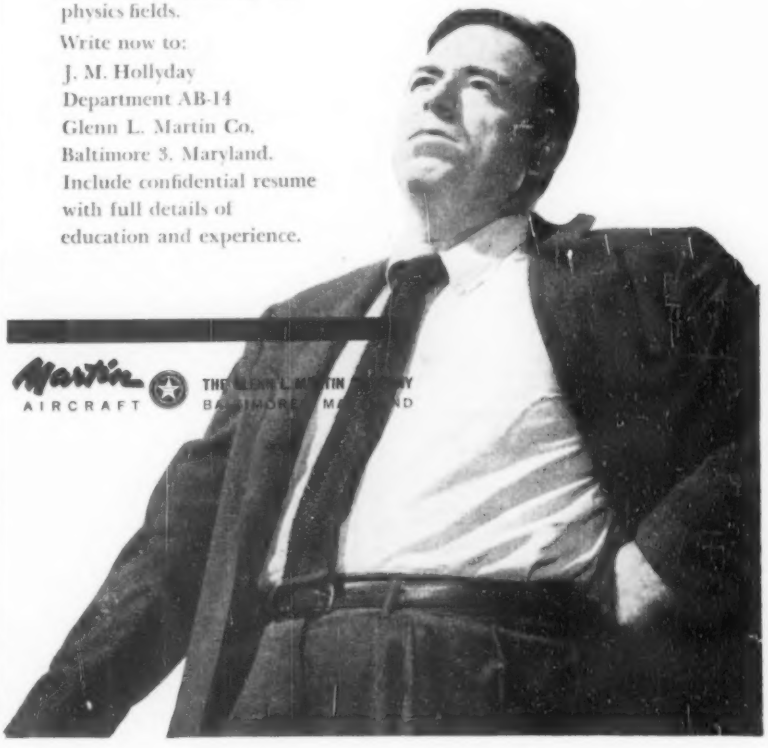

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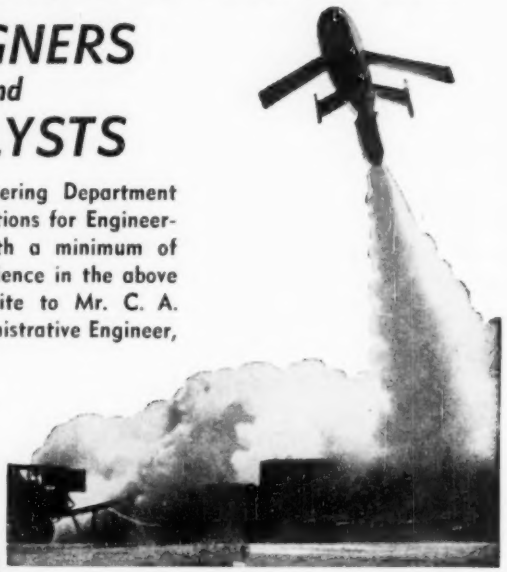

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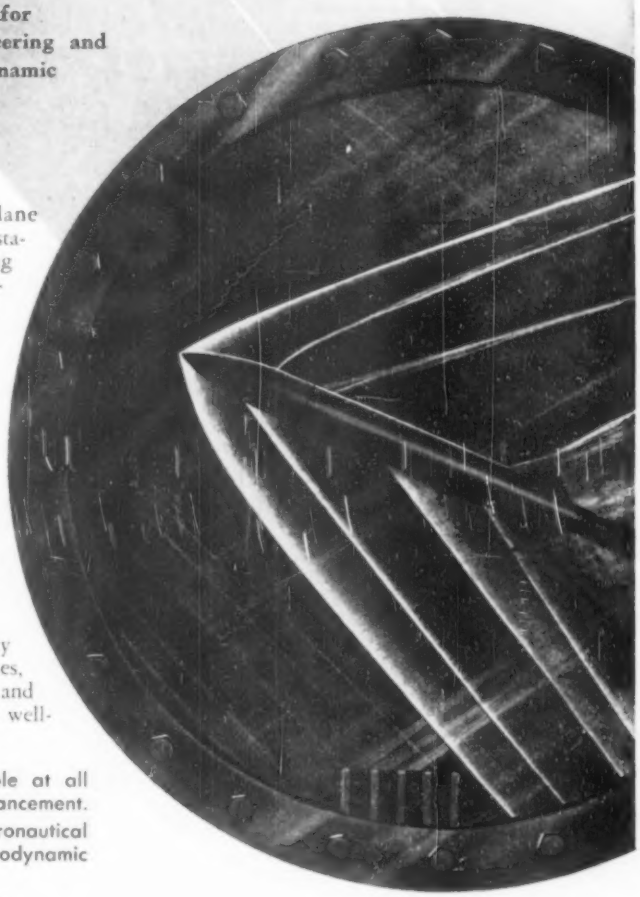

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Reds Scoop U. S. Newsmen on Mach 27 Copter

(Editor's Note: The following story by Chuck Newton of Convair's San Diego public relations staff was released to Aviation Writers Assn. at Miami Beach, Fla.)

Washington, D. C.—It was disclosed officially today that the U.S. has ordered an indefinite quantity of items of an unidentified nature from a manufacturer located in the western part of the United States. The announcement was made by a highly placed government official who requested that his name not be revealed.

Pressed for details, the spokesman told a jam-packed press conference that by stretching a point, he was able to say that the items are designed for passage through the air.

Asked if the manufacturer's factory was not, in fact, located in California, the official gave only a knowing wink. This concluded the press conference.

Aircraft industry observers believe that today's announcement concerns a supersonic helicopter, known as the "Gone," believed to be in production at the Ajax Wheelbarrow and Airplane Works of Frostbite, Calif. Although company officials have been unable to confirm or deny the existence of the project, Ajax is believed to have been actively at work on the craft for the past 12 years.

In 1947, the official Russian magazine "Flizolkivich" printed a 24-page supplement concerning a supersonic helicopter which was described as being in production at Ajax Wheelbarrow in the U.S. The supplement included photographs, detailed three-view drawings and loft lines, and a complete set of performance curves.

(Editor's note: The Aviation Editor of Affiliated Press has had details of the "Gone" project since 1945. On October 17, 1949, the Affiliated Press submitted to the government a story on this helicopter, requesting permission to release the story publicly. Although facts in the story were generally known in the industry, could be ascertained from a reading of the article in "Flizolkivich," or by personal observation through the Ajax fence, to date the government has refused to release the story. In the interval since 1949, Affiliated Press has written 176 letters on the subject to the government, has rewritten and re-submitted the story 81 times at government request, and has collected a complete set of government regulations on release of security information, now totaling 11 pounds, 12 ounces. These regulations purport to describe the method for submission and clearance of stories for release.

(Affiliated's corps of librarians, working in two shifts, have so far uncovered 497 specific contradictions in the provisions of the regulations, but have failed to unearth a clear-cut method to submit and clear a story. The latest government response to Affiliated's request to release the "Gone" story, received just three days ago, admits that the facts concerned do not violate security regulations, but the story is stamped "Official information only—not for public release." Meanwhile, several toy manufacturers are producing models of the "Gone," and the latest Gallup Pole indicates that this aircraft is better known to the man on the street than any U.S. airplane since the Jenny.)

Acute observers have noted that several hundred helicopters resembling the one shown in "Flizolkivich" are lined up against a fence at the Ajax factory, adjoining a 12-lane public highway.

Small boys of the neighborhood, who have climbed the fence and inspected the ships, report that their airspeed indicators are calibrated from Mach 5 to Mach 27. These same sources report that the aircraft appear to be fitted out for long-distance reconnaissance, as their interiors include large divans and ladies' powder rooms.

In Washington, aviation circles were inclined to agree that today's government announcement referred to the "Gone" supersonic helicopter. Since 1951, the official compendium of work in progress of the Bureau of the Budget has listed Ajax Wheelbarrow as having a large government project for "unusual helicopters" under the code name "Went." The code name "Went" is believed to be a security ruse for "Gone," although some officials have referred to a Mark 2 Ajax helicopter, known as the "Real Gone."

AVIATION CALENDAR

June 22-25—Symposium on Global Communications, sponsored by Institute of Radio Engineers, Statler Hotel, Washington, D. C.

June 24-26—American Helicopter Society, 10th annual forum, Washington, D. C.

July 3-5—Elmira Area Soaring Corp., Northeastern States Soaring Championships, Harris Hill, Elmira, N. Y.

July 3-6—Eighth annual All Women Transcontinental Air Race, sponsored by Ninety-Nines, Inc., Long Beach, Calif., to Knoxville, Tenn.

July 3-11—Philadelphia Glider Council, annual Open House Week; July 11-17, Glider Training Camp, both at Hilltown, (Pa.) Gliderport.

July 4—Western National Air Show & Races, including closed-course midget racer events, sanctioned by National Aeronautics Assn., Dansville, N. Y.

July 4—Sesquicentennial National Air Show, County Airport, Somerset, Pa.

July 11—Air show and dedication of Port Columbus Airport control tower, Columbus, Ohio.

July 13-15—Western Plant Maintenance Show, managed by Clapp & Poliak, Pan-Pacific Auditorium, Los Angeles.

July 22—Third National Aviation Education Workshop, sponsored by CAP and the University of Colorado, Boulder, Colo.

July 27-Aug. 5—21st National Soaring Contest, Elsinore, Calif.

Aug. 7-8—Experimental Aircraft Assn., fourth annual National Air Pageant and second annual fly-in and convention, featuring "home-built" aircraft, sportsplanes, racers and antiques, Milwaukee.

Aug. 9-10—American Society for Quality Control, first annual Western Regional Conference, to be held in conjunction with the National Conference of the Aircraft Technical Committee, U. S. Grant Hotel, San Diego.

Aug. 9-11—Institute of the Aeronautical Sciences, turbine-powered air transportation meeting, Seattle.

Aug. 22—National Air Show, Hazelton, Pa.

Aug. 25-27—Western Electronic Show & Convention (WESCON), sponsored by West Coast Electronics Mfg. Assn. and Institute of Radio Engineers, Ambassador Hotel, Los Angeles.

Sept. 4-6—National Aircraft Show, Dayton, Ohio.

Sept. 13-24—Instrument Society of America, first International Instrument Congress and Exposition and third annual Analytical Instrument Clinic, Philadelphia.

Sept. 21-23—Society for Experimental Stress Analysis, annual meeting and exhibition, Bellevue-Stratford Hotel, Philadelphia.

Oct. 4-6—Tenth annual National Electronics Conference, Hotel Sherman, Chicago.

Oct. 5-7—Champion Spark Plug Co., 10th annual Aircraft Spark Plug and Ignition Conference, Secor Hotel, Toledo, Ohio.

Oct. 17-22—International Union of Aviation Insurers, annual general meeting, New York.

Oct. 18-22—National Safety Council, Aeronautical Section, Conrad Hilton Hotel, Chicago.

Nov. 8-9—National Aviation Trades Assn., annual convention and meeting, Biltmore Terrace Hotel, Miami Beach, Fla.

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EDITORIAL

Low Fares Win the Millions

We believe the Civil Aeronautics Board is right in its decision against domestic passenger fare increases at this time.

With thousands of additional seats to sell on an expanding fleet of airliners in coming months, it seems a strange time to raise fares. Load factors show we are not selling many more than half of the seats that are available even today.

There is no question that the industry will have its financial problems in the coming year. But growth pains are more tolerable than the creaks of decay. Let's take the long-range view.

Earnings cannot help but drop as profit per passenger is less than in the days of a higher proportion of first-class passengers, in smaller aircraft with fewer seats.

In 1954, the airlines expect it to cost them 96 cents for every dollar's worth of traffic produced. But there is growing realization that the profit rate must be subordinated to the job of filling these additional seats and building an ever-larger market that will be reflected in a nation that takes to the air at every opportunity.

As the CAB put it so well, "while unit costs have remained stable or slightly declined, and while traffic has continued to increase, load factors and, as a result, earnings, have declined.

"In a situation where industry earnings appear to be declining primarily because the growth of industry capacity has temporarily exceeded the growth in its traffic, it would appear to be premature to rush into a consideration of basic fare changes as a remedy for the dislocation."

The Board thus answers the frequent cries that "rising costs" require higher fares. Nothing could be done that would halt quicker the current amazing trend to air travel than a fare increase.

Industry's big job is to sell seats. Higher fare brings no more revenue from an empty seat. Leaders like Eastern's Rickenbacker and TWA's Damon know this well. They are not bewailing the "rising costs," although they know full well that their unit profit per passenger is sliding. Barring a war, the good old days of high fares are over, forever!

Now it is a matter of filling the seats we have, and those we add in coming months. That means selling.

Despite reports that some effort may be exerted to get CAB to reverse its stand on fares, a policy statement indicates that instead of crying the blues over lower unit profits, the Air Transport Association is beginning to grasp its opportunities to win more millions of converts to flight.

It is embarking on a positive program.

Its spokesmen are beginning to reflect confidence and realization of the future that can be clinched in the coming year. It is showing evidence of looking at the bright side of the revolution that is underway in American transportation.

"We know where we're going, and what we've got to do," Stanley Gewirtz, ATA's assistant to the president, told the Aviation Writers Association Convention.

"First off, we intend to penetrate the existing common carrier market on long hauls. We're not satisfied with 71 out of every 100 passengers traveling over 1,000 miles on all common carriers. In 1953, we collected 85 cents out of every dollar spent in that travel area.

"Then we're going out to find new markets. We've made a magnificent start in that direction. This year, we're going out, in conjunction with some reputable survey groups, to find out through intelligent depth interviewing why, where, when, and how people travel and what we can do to change their travel habits and attract their business. . . ."

Last year, Mr. Gewirtz noted, the airlines carried more people more miles more quickly, providing more adequate service, yet only 60% of the airline seats were filled.

"This, in the face of the prospective delivery of 170 new, large aircraft in the next 18 months." Even on a conservative average of 55 seats in each plane, that is 9,350 more seats to sell with each one-way flight made by this new fleet.

The ATA realizes the industry must sacrifice high profit ratios in the coming months of a difficult period in order to build America into an air-traveling public whose millions will offer a market of broad and stable base, and eliminate for all time as serious competition the longhaul bus, train and ship.

Some airlines will experience acute difficulties. The sales potentials in some regions are admittedly lower than in others. The pinch inevitably will bring mergers and some major readjustments in the airline map. But these must necessarily give way to the enormous growth in commercial air transportation that is already upon us.

—Robert H. Wood

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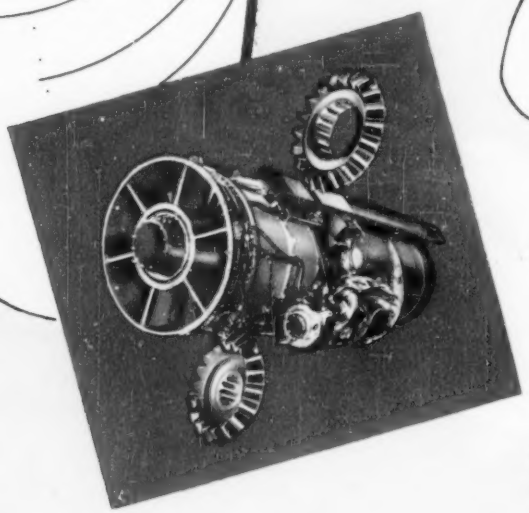

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